



WATER RESOURCES
OF THE
MANNING VALLEY

SURVEY OF THIRTY N. S. W. RIVER VALLEYS

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WATER RESOURCES OF THE MANNING RIVER VALLEY

PREFACE

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MINISTER FOR CONSERVATION

NEW SOUTH WALES

In accordance with the policy of the New South Wales Liberal-Country Party Government announced prior to its election to office at the May, 1965 State Elections, I directed the Water Conservation and Irrigation Commission to undertake a survey of the State's water resources on an individual valley basis to enable the formulation of a balanced and soundly based programme of water conservation.

The survey, which is the largest and most comprehensive study of its type ever undertaken, has recently been expanded to cover the Murray and Darling Basins in their entirety. It involves the preparation of twenty seven reports covering thirty two major river valleys of the State.

In the survey, studies are being made of the physiography, climate, groundwater potential and surface water resources of each valley. In addition to reviewing current water requirements, assessments are being undertaken of possible future water development.

Reports are being prepared progressively and those issued to date have covered eighteen major valleys and a number of minor valleys. This report on the water resources of the Manning River Valley is the fourteenth to be issued.



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WATER RESOURCES OF THE MANNING RIVER VALLEY

1. INTRODUCTION.

The most vital natural resource necessary for the welfare of mankind, apart from air, is water. Obviously there is a preponderance of this resource on the surface of the earth, over 74 percent of the total area being covered by the oceans and polar icecaps whilst the remaining 26 percent, comprising the land masses, is frequently covered by surface water in lakes or streams or by water vapour in clouds.

The total volume of water, saline and fresh, on earth has been estimated to be of the order of 320 million cubic miles. As one cubic mile is equivalent to about a million million gallons it is difficult to visualise the magnitude of this resource.

However, the major proportion of this resource is stored in the oceans or polar icecaps to such an extent that the amount of water in lakes or rivers represents only about 0.004 percent of the total. Furthermore, the available water resources are neither evenly distributed in time nor are they normally located in areas suitable for water resources development.

The aim of water conservation works is to reduce these variations by storing water during flood periods for subsequent release during droughts and by constructing water distribution works to enable supplies to be delivered to areas remote from river systems.

Of all the continents, Australia has the least average annual rainfall, the average being only about $1\frac{1}{2}$ feet whereas Africa, Asia, Europe and North America all receive about 2 feet and South America receives an average of almost $4\frac{1}{2}$ feet.

However, when losses due to the natural processes of evaporation, transpiration and seepage are deducted from the average rainfalls of the continents, the residuals (or surface water resources), show that Australia's runoff is much lower than indicated by the average rainfalls. The average annual surface water resources of the Australian mainland have been assessed at about 240 million acre feet per annum which is equivalent to a depth of less than 2 inches over the continental area. In comparison runoffs for the other continents are 7 inches in Africa, 9 inches in Asia and Europe, 11 inches in North America and about 19 inches in South America.

In addition to the relatively low average annual runoff over the continent, Australian streams tend to exhibit great variability in flows. Therefore, it is necessary to construct relatively large water conservation storages if assured water supplies are to be maintained over the full period of each drought.

The water resources of a nation are of major importance to national economy, the welfare of the community depending to a large extent on their proper development and use. Water conservation in Australia is therefore a service of prime national importance, increasing living standards and overall national wealth.

It has been estimated that the minimum daily water requirement of man on a continuous basis is less than one gallon per day; however the average per capita consumption of a large modern city may be of the order of 300 gallons per day. Of course the per capita consumption figure is somewhat misleading in that demands due to industry, home gardens, parks and community services are included in determining the overall average.

Industrial water demands can be comparatively high in relation to domestic requirements. About 300 tons of water are required to make a ton of steel, 60 tons of water are used in producing a ton of paper and about 2½ tons of water are necessary to grow the grain and produce a loaf of bread. In addition it has been estimated that over thirty tons of water are used in producing a normal daily diet for an adult.

The annual water requirements of crops usually range between two to three feet, and during a drought period it is necessary to provide a major proportion of these requirements by irrigation. The relative magnitude of this demand can be assessed when it is realised that a depth of three feet over an area of only one acre represents over 800,000 gallons of water (more than 3,500 tons).

In view of the increasing demand for water for irrigation, industrial and domestic purposes, the continued development of Australia as a nation will require the construction of many more large water conservation storages in the future. Furthermore it will be necessary to ensure that the flows provided by these and existing storages are used effectively.

The surface water resources of the Manning River Valley have been assessed as being of the order of 1,800,000 acre feet per annum. As the average annual rainfall over the valley is about 46 inches the surface water resources represent a runoff of about 23 percent.

On a square mile basis the surface water resources of the Manning River Valley are nearly $1\frac{1}{2}$ times the average for coastal basins in New South Wales and more than five times the average for the total area of the State.

2. PHYSIOGRAPHIC FEATURES.

The catchment of the Manning River Valley, as adopted for the purposes of this report, is shown at Figure 1; the total area of the valley being about 3,250 square miles. The valley is situated in the mid-north coast region of New South Wales and is bounded on the north east by the Hastings River Valley, on the north west by the Peel River Valley, on the south and south west by the Hunter River Valley and on the south east by the Karuah River Valley.

In comparison with other valleys in the State, the Manning River Valley is generally mountainous and undeveloped, deeply dissected uplands comprising the major portion of the valley.

The valley consists of four main topographic zones; plateau areas, dissected uplands, alluvial valleys and coastal riverine plains.

In general, major streams in the Manning River Valley commence on plateaux or in dissected uplands and flow easterly or south easterly through alluvial valleys, and, in the lower section of the valley, the Manning River traverses the coastal riverine plain zone.

The Manning River rises in a plateau area of the Mount Royal Range about ten miles north of the Barrington Tops. The general elevation of the plateau is from 3,500 feet to 4,500 feet and the land slopes vary from undulating to hilly. However, the Manning River soon enters the dissected upland zone and passes through mountainous country, traversing waterfalls and rapids in its steep descent to the alluvial valleys. Until the Manning River reaches the Gloucester River junction, alluvial flats are virtually non-existent, the channel passing through heavily forested, steep sided valleys.

The main western tributary of the Manning River, the Barnard River, rises in mountainous country in the extreme west of the valley at elevations of from 3,300 feet to 4,000 feet. The upper tributaries of the Barnard River drain sections of the Great Dividing Range on the north and the Mount Royal Range on the south. In the upper reaches of its catchment the Barnard River drains a plateau area extending south east from Barry. However the Barnard River quickly

enters mountainous country below Barry and although it traverses some hilly to steep country in its lower reaches there is little alluvial development along its entire course to its junction with the Manning River.

The major tributary of the Barnard River is the Myall River which rises near the Black Sugarloaf, about 15 miles north west of Nowendoc, at elevations up to 4,900 feet and travels through mountainous terrain in a south easterly direction to join the Barnard River.

The Nowendoc River system drains the central northern section of the Manning River Valley, the main tributaries of this river being the Cooplacurripa, Mummel and Number Two Rivers. The headwaters of the Nowendoc River are situated east of the Black Sugarloaf in elevations ranging from 4,200 feet to 4,900 feet and this river traverses generally undulating to hilly country from its headwaters to about four miles downstream of Nowendoc where it enters dissected mountainous country. The main tributaries of the Nowendoc River all rise in mountainous country and with the exception of limited areas of undulating to steep country in their lower reaches, their entire catchments are in the mountainous terrain category.

The Barrington and Gloucester Rivers are the remaining major tributaries of the Manning River, and both of these streams drain the south western sector of the Manning Valley. The Barrington River rises in the Barrington Tops and land slopes in its extreme uppermost reaches vary from flat to hilly. About five miles from its headwaters, the Barrington River enters rugged terrain and this type of country generally persists until the river enters an alluvial plain about four miles south of Barrington.

The Gloucester River commences in the Gloucester Tops, a plateau area at an elevation of about 4,300 feet, and, like the Barrington River, flows through mountainous terrain before entering a plain about six miles south west of Gloucester. Notable peaks in the upper Gloucester River catchment are Careys Peak (5,060 feet) and Mt. McKenzie (4,700 feet).

The Avon River is a relatively minor tributary of the Gloucester River and although the headwaters of this stream commence in rugged country at elevations of up to 3,200 feet, the channel descends rapidly and enters a flat flood plain of width three to four miles near the southern border of the valley. This flood plain extends in a northerly direction to near the junctions of the Avon, Gloucester and Barrington Rivers immediately to the north west of Gloucester.

The catchment boundary at the southern end of this flood plain is at a lower elevation than in any part of the Upper Manning Valley, being only about 500 feet above sea level near Craven.

Between Gloucester and the Manning River, the Gloucester River passes through undulating to hilly terrain and enters a narrow alluvial plain close to its junction with the Manning River about 15 miles west of Wingham.

The catchment to the north of Wingham is drained by Dingo and Cedar Party Creeks and their tributaries. These creek systems rise in two unusual plateau areas on the north eastern border of the Manning River Valley. The first of these plateaux, the Bulga Plateau, is situated at an elevation of about 1,200 feet above sea level and is of undulating to hilly terrain. The majority of streams commencing in this area drain into the adjoining Hastings River catchment. However the southern boundary of this plateau with the Manning River Valley is quite steep and is covered by rain forest.

The second plateau, the Comboyne Plateau, is located about 10 miles east of the Bulga Plateau and has an area of about 70 square miles. It is somewhat flatter in general land slopes and is more closely settled. Killabakh Creek and the Lansdowne River rise in the steep southern slopes of this plateau, the former flowing into Cedar Party Creek which subsequently joins the Manning River near the town of Wingham.

The Lansdowne River drains the flat northern coastal section of the Manning River Valley, including some limited areas of rugged country along the catchment border, and enters the Manning River near Coppernook. However, in its lower reaches the general landform is quite flat particularly adjacent to the river channel. Substantial areas of low lying swamp land occur between the lower Lansdowne River and the coastline.

The lower Manning River is subject to tidal influence up to about two miles above Wingham, and, in its lower reaches, consists of a number of channels which enclose relatively large islands. The Manning River finally joins the South Pacific Ocean at Harrington about four miles south of Crowdy Head.

In the lower Manning River Valley dairying and beef cattle raising are the principal agricultural activities, dairying being confined to the relatively flatter topography. By far the major rural activity in the middle and upper sections of the valley is grazing, particularly on steeper or less fertile areas.

Many areas of the valley, particularly in the western and north western sections, are uninhabited and apart from grazing, are largely unused for any type of agricultural activity.

Land slopes in the Manning River Valley are shown at Figure 2. The flat areas in the valley, with slopes less than about 3 degrees, are very limited and total only 9 percent of the overall area. It should be noted that the extensive swampy coastline areas are included in this percentage.

Rugged to mountainous areas, with slopes greater than 15 degrees, predominate throughout the valley, and this category comprises 67 percent of the total area. Undulating to hilly (slopes between 3 and 8 degrees) and hilly to steep (slopes between 8 and 15 degrees) terrain make up the remaining areas of the valley and comprise 13 percent and 11 percent respectively of the total valley area.

3. CLIMATIC FEATURES.

Rainfall

The valley of the Manning River is well watered. Annual median rainfalls exceed 35 inches over the whole of the valley with the exception of a minor area in the vicinity of Glenrock on the mid western border of the valley. The median is that rainfall equalled or exceeded on 50 percent of occasions.

The highest annual rainfall occurs over elevated country in the north eastern sector of the valley near Comboyne where the annual median exceeds 65 inches. As indicated a relatively low rainfall area occurs in the mid western sector of the valley over the southern tributaries of the upper and middle reaches of the Manning River where annual medians are generally less than 40 inches and are lower than 30 inches in the vicinity of Glenrock.

The distribution of annual median rainfalls over the Manning Valley is shown at Figure 3 whilst the distributions of monthly median rainfalls are shown at Figures 4 to 15 inclusive.

The wettest period in the year occurs from December to April inclusive when about 55 percent of the annual rainfall is received. Along the coast the wet period may extend until June.

For the months from December to April, monthly median rainfalls exceed 2 inches and are greater than 7 inches per month at some stations.

The period from July to November is relatively dry, about 30 percent of the annual rainfall being received during this period. Nevertheless monthly median rainfalls during these months exceed $1\frac{1}{2}$ inches over all the valley and are more than 4 inches over the higher rainfall areas in some of these months. Usually August is the driest month, only about 4 percent of the annual rainfall being received on the average.

Monthly and annual rainfalls recorded at Comboyne, Glenrock, Gloucester, Greenwood, Krambach, Moorland, Port Macquarie, Taree, Waterloo-Krambach and Wauchope are given in Appendices 1 to 10 inclusive.

Very heavy rainfalls may be experienced in the valley when depressions are located off the north coast of New South Wales. During such periods, totals of 8 inches in 24 hours are not uncommon. The highest total recorded in the valley in a 24 hour period ending 9 a.m. is 14.79 inches at Moorland on 16th April 1927.

In any month of the year very high totals can occur at stations in the valley. Totals exceeding 30 inches have been recorded at some stations whilst, during the usually drier months totals in excess of 10 inches have been recorded. The maximum monthly rainfall on record for a station in the valley is 40.23 inches at Moorland in January 1895.

The tables at Appendix 11 show on a monthly and annual basis for Comboyne, Taree, Waterloo-Krambach, Port Macquarie, Wauchope and Moorland the following data:

- (1) the maximum and minimum rainfalls;
- (2) the 10th, 30th, 50th, 70th and 90th percentiles. (A rainfall observation less than the 10th percentile can be expected once in ten years on the average. Similarly a rainfall observation less than the 70th percentile can be expected seven times in ten years, or alternatively a rainfall observation greater than the 70th percentile can be expected on an average of three years in ten).

On occasions very low totals are recorded in individual months, however it is unusual for dry spells to persist for more than a few months, especially in the coastal areas. During the relatively dry period from July to November at least $5\frac{1}{2}$ inches are recorded on 90 percent of occasions. In the wettest period from December to April at least 13 inches are received on 90 percent of occasions. The corresponding median values for the foregoing periods are 12 inches and 22 inches respectively.

The minimum recorded rainfalls at Comboyne, Taree, Waterloo-Krambach, Port Macquarie and Wauchope are shown in the tables at Appendix 12. These tables indicate the minimum cumulative rainfalls, commencing in any month of the year, and continuing for up to twelve months, which have occurred at the selected stations.

Temperature.

The temperature records for Taree, as shown in Table 1, adequately define the temperature regime of the lower reaches of the Manning Valley. However, no temperature records are available for inland areas of the valley, on the eastern slopes of the Great Dividing Range.

Temperatures in the inland section of the valley may be estimated by reducing by about 3°F. for every thousand feet the locations are above sea level.

TABLE 1.

TAREE (Elevation 30 feet)

Average Temperature (°F) Based on 29 Years of Record

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Average Maximum	83.9	83.0	80.5	75.7	69.8	65.7	64.5	67.0	72.0	76.5	80.3	82.6	75.1
Average Minimum	62.0	62.1	59.5	54.7	49.2	44.5	42.7	43.7	47.0	51.9	56.4	60.7	52.9
Average Daily	72.9	72.5	70.0	65.2	59.5	55.1	53.6	55.3	59.5	64.2	68.3	71.6	64.0
Highest on Record 114.0°F.						Lowest on Record 25.0°F.							

During the months from October to April, warm to hot weather occurs in the valley, the average maxima varying from the mid seventies to the mid eighties in the lower parts of the valley away from the coast. Somewhat cooler conditions occur in the higher area of the valley and also along the coast where sea breezes tend to reduce average maximum temperatures. Conditions during the remainder of the year are usually cool to mild.

Very hot conditions can be experienced in the summer months when north westerly winds transport hot dry air from Central Australia. Temperatures exceeding 90°F. occur frequently, whilst temperatures greater than 100°F. occur on an average of about three days per year in the lower areas of the valley away from the coast.

The average minima during the winter months are about 18 degrees below the corresponding summer values. Very low overnight temperatures can occur under conditions of clear skies and light winds. In the lower areas of the valley away from the coast extreme minima as low as 22°F. have been recorded and it is likely that extreme temperatures below 18°F. would occur over the elevated sections along the western border of the valley.

Frosts.

Along the coastal fringe, frosts are a rare occurrence. However, in the lower sections of the valley inland from the coast, an average of about four frosts per year are experienced in the months of June, July and August. Over the higher parts of the ranges in the western sector of the valley, it is estimated that an average of about 40 frosts per year would occur during the months from April to October.

Sunshine.

Estimates of the average duration of bright sunshine in hours per day for the valley are shown in Table 2.

TABLE 2.
Average Duration of Sunshine in Hours per Day

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
8.9	7.9	7.3	6.8	6.4	6.3	6.8	7.4	8.0	8.1	8.3	8.7	7.6

Evaporation.

Estimates of average monthly and annual evaporation, from a sunken pan, together with estimates of the standard deviations are shown in Table 3 for the Manning Valley.

TABLE 3.
Estimated Average Monthly and Annual Evaporation
in Inches for the Manning Valley

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Evaporation	5.5	3.7	3.5	2.6	2.3	1.6	1.3	2.3	2.8	3.8	5.0	5.7	40.1
Standard Deviation	0.7	0.7	0.7	0.4	0.4	0.4	0.3	0.4	0.5	0.7	0.9	0.9	3.7

Wind.

In the Manning Valley strong winds occur on occasions usually in association with one of the following meteorological conditions:

- (1) Strong east to south east winds associated with deep depressions located off the north coast of New South Wales. These depressions, which frequently originate as tropical cyclones, may still be of cyclonic intensity when they influence the climate of the valley. Under these conditions wind speeds may exceed 60 miles per hour near the coast but tend to moderate in inland areas.
- (2) Violent squalls associated with severe local storms such as thunderstorms or frontal squalls. Wind gusts under these conditions can be about 100 miles per hour.

The extreme wind gusts likely to be experienced in the catchment, for various return periods, are shown in Table 4.

TABLE 4.

Estimated Extreme Wind Gusts to be Expected
With Given Return Periods.

Return Period (years)	10	20	50	100
Wind Gust Equalled or Exceeded (miles per hour)	90	95	105	110

4. GROUNDWATER POTENTIAL.

The catchment of the Manning River lies within the belt of folded Palaeozoic rocks which form the Great Dividing Range along the east coast of Australia. The geology and physiography have a major influence on the groundwater potential of the area. Precise knowledge of the availability of groundwater is restricted to a narrow zone along the lower reaches of the Lansdowne and Manning Rivers where the country has been developed.

The oldest rocks in the valley are the Silurian slate, quartzite, sandstone and tuff which outcrop in high rugged country in the northern half of the catchment as shown on the geological map, appended at Figure 16. They have been strongly folded by a number of major earth movements, during which they

have also been fractured and recrystallised to some extent. The slightly younger Devonian rocks have also been strongly deformed, but less so than the Silurian rocks, and consist of quartzite, chert, and tuff and occupy a large area along the central part of the valley in a belt extending from Taree.

The Carboniferous and Permian rocks which underlie large areas of the central and eastern part of the catchment, are gently folded and practically unaltered. They consist of tillite, mudstone, sandstone, shale, and tuff which for the most part were laid down under marine conditions, particularly the Permian, and connate salt is still present in many of the formations. Jointing and fracturing in these rocks is not so severe as in the older rocks. Outcrops of the Permian rocks are restricted to the central zone of two synclinal structures, in meridional belts extending south from Gloucester and north from Wingham.

Of the post Palaeozoic rocks in the area, only the flat lying Triassic sandstone and shale sequence is of sedimentary origin, and these occupy only a very small area north of Taree. These rocks are part of a large upland area which forms a portion of the watershed between the Manning and Hastings valleys, and in which most of the outcrop area is situated within the Hastings catchment.

The most important post Palaeozoic rock unit is the basalt, which was extruded during the Tertiary Period and which directly overlies the Silurian, Devonian and Carboniferous rocks. It generally crops out in elevated areas, and underlies a considerable part of the drainage divide that bounds the catchment area.

Other igneous rocks which crop out in small areas are serpentine and granite, but although they are important from a strictly geological point of view their influence on groundwater conditions is negligible.

The youngest geological unit which occurs in the catchment is the alluvium along the main river courses and in the estuary. Upstream from about Taree, the alluvium is of fresh water origin. Downstream from Taree, much of the alluvium has been deposited under estuarine conditions, and black mud with shelly bands occurs to depths of at least 80 feet in some places. The youngest

deposits along this part of the river are the present channel deposits and the levee bank deposits, which overlies the estuarine material. There are also sand dune deposits near the coast, but their extent and thickness is not great.

The groundwater potential of the Palaeozoic rocks in this catchment area is limited, and it is unlikely that any but stock supplies will be available from them. Records of only three bores or wells which penetrate into rock are available for the whole catchment, and these indicate that the Carboniferous sandstone contains stock quality water and that the Carboniferous shale contains saline water. Water stored in the Permian rocks is also likely to be saline. Hence, prospects of obtaining stock supplies of acceptable quality in the areas underlain by Carboniferous and Permian rocks are variable, and without additional bore data will remain largely unpredictable. No bores are known in the Devonian or Silurian rocks, but it is likely that small stock supplies should be available from suitably located bores in most cases. Individual selection of sites would be necessary.

The only other rock unit which may have any considerable groundwater importance is the Tertiary basalt. No bores are known in it, and its location in the higher areas, mainly around the perimeter of the catchment, makes it unlikely that much development will take place. The basalt is the southern part of an extensive basalt cap of the Great Dividing Range, and is an outlier of the Liverpool Range basalt. There is a considerable catchment and storage available, and it is quite likely that moderately large yields could be obtained by boring. Many of the small streams which form the headwaters of the Manning system are no doubt fed by springs around the base of the basalt.

The alluvium along the main river valleys is the only source of substantial groundwater supplies. Even this source is rather limited, and although maximum yields of up to 15,000 to 20,000 gallons per hour are obtained from individual wells, the area in which such supplies can be found is quite small. From Taree upstream to Wingham there are narrow flats on both sides of the river and the quality of water from the alluvium is very good. Most of the existing wells are in the downstream part of this section, and the water is used mainly for irrigating vegetables. Generally, however, the flats are narrow and most properties have access to the river and do not need wells. Upstream from Wingham the alluvium occurs in discontinuous pockets and its potential is very low.

Downstream from Taree, connate salt in the estuarine deposits, together with the saline influence in the river, presents considerable problems to groundwater development. Only the more elevated young river levee banks produce useful quantities of low salinity groundwater. This source, however, is generally insufficient for irrigation, and overpumping would rapidly cause saline water intrusion. Yields of a few hundred gallons per hour, with rare cases of up to 2,000 gallons per hour can be obtained from depths of 25 to 30 feet. It is important to realise that recharge to these aquifers comes from local infiltration, and not from the main river. If the water table is lowered to the extent that recharge from the river is induced, saline water intrusion into these aquifers will make them as useless as the underlying estuarine deposits. Such a situation has already occurred to some extent on the Hastings River.

The above comments concerning the area downstream of Taree apply also to most of the delta area, including parts of Oxley and Mitchells Islands, the flats between Cundletown and Cooperook, and Jones Island. Hence the groundwater potential is rather poor.

An exception is the area around Harrington, including the western part of Mitchells Island and a large part of Oxley Island, where sandy soil and limited sand dune areas occur. Spear points to a depth of 20 feet produce useful supplies including some suitable for limited irrigation, and larger supplies could be obtained from more efficient withdrawal works. Need for development of groundwater resources in this area has not yet arisen because of the limited habitation of the area. Future agricultural development will be restricted by the swampy nature of the country but the groundwater may become important for urban uses in the future.

The potential for development of large yields of groundwater in the Manning River Valley is small, and is restricted to a small area along the river upstream from Taree. Stock supplies, and in some cases small irrigation supplies are available from most of the delta area. Prospects for obtaining stock supplies in the bulk of the catchment from rock formations are variable, with large areas having a high risk of yielding salt water.

5. STREAM GAUGING STATIONS.

Reliable records of streamflows are one of the most important factors in water resource investigations as they govern the economic and engineering aspects of schemes for irrigation development, town and country water supply and hydro-electric power generation.

In view of the importance of streamflow data in the investigation of surface water resources, it is necessary to collect adequate records of streamflow in a valley.

Records of streamflow are obtained from gauging stations, where stream heights are recorded either by visual readings on a graduated scale or staff gauge, or by means of a continuous record produced by a float or pressure actuated recorder. Each gauging station is calibrated by obtaining a number of measurements of stream discharge, each measurement corresponding to a particular gauge height. Individual measurements of stream discharge are obtained by the use of a current meter to measure flow velocities in conjunction with survey methods to determine the area of effective flow. The combination of flow velocities, in feet per second, and effective discharge areas, in square feet, gives the discharge of the stream in cubic feet per second or cusecs.

Discharge at a stream gauging station is usually given in terms of cusecs; one cusec flowing for one day being approximately equal to two acre feet or the volume of water which would cover an area of one acre to a depth of two feet. In catchment yield studies the total volume of runoff, usually during one year, is frequently expressed in inches depth over the total area of the catchment.

The measurement of streamflows in the Manning Valley commenced with the establishment of stream gauging stations on the Barrington River at Bobs Crossing and on the Manning River at Tomalla in 1944. Both stations are currently in operation.

Gauging stations were also established in 1944 on the Manning River at The Falls, the Manning River at Campbells No. 1 and on the Barrington River at Big Hole but these three stations have since been discontinued.

Since 1944 additional stations have been established and at the present time the Water Conservation and Irrigation Commission is operating eleven gauging stations so located as to measure the runoff from about 80 percent of the Manning Valley and to provide adequate basic data for use in water resources investigations.

The current density of gauging stations in the Manning Valley is about 3.4 stations per 1,000 square miles. This density compares favourably with the present approximate densities of 0.5 stations per thousand square miles for Australia, but is less than the current density of 4.7 stations per 1,000 square miles for Coastal New South Wales. However it is about twice the density of 1.7 stations per 1,000 square miles for Inland New South Wales.

It is currently proposed to expand the existing stream gauging network in the valley by the installation of an additional seven gauging stations. In addition, it is intended to improve the standard of recording at two key stations in the valley by the installation of long term automatic stream height recorders.

The ultimate coverage to be provided will result in a network density of nearly 5.5 stations per 1,000 square miles and should provide sufficient data for the appraisal of the majority of any future water conservation or utilisation schemes in the valley.

The locations of all gauging stations in the Manning River Valley are shown at Figure 17 and relevant details concerning each station are given in Table 5.

TABLE 5.

Stream	Station	Catchment Area (Square Miles)	Type of Gauge	Period of Operation
Manning River	The Falls *	5	Staff Gauge	1944 to 1949
Manning River	Campbells No. 1 *	17	Staff Gauge	1944 to 1953
Manning River	Tomalla	20	Float Recorder	1944 to date
Manning River	Woko	185	Manometer Servo	1964 to date
Barnard River	Barry	58	Pressure Recorder	1949 to date
Barnard River	Kauthi *	670	Pressure Recorder	1952 to 1962
Barnard River	Mackay	690	Manometer Servo	1962 to date
Nowendoc River	Nowendoc	84	Staff Gauge	1946 to date
Nowendoc River	Rocks Crossing	720	Staff Gauge	1945 to date
Gloucester River	Forbesdale	80	Pressure Recorder	1948 to date
Barrington River	Big Hole *	8	Staff Gauge	1944 to 1951
Barrington River	Bobs Crossing	8	Float Recorder	1944 to date
Barrington River	Forbesdale	243	Staff Gauge	1945 to date
Gloucester River	Doon Ayre	620	Manometer Servo	1945 to date
Manning River	Killawarra	2,530	Pressure Recorder	1945 to date

* Discontinued Station.

6. CATCHMENT YIELDS.

The water yield of a catchment is related to many factors, the main ones being precipitation, topography, geology, vegetation and area. The systematic recording of streamflow within the Manning Valley has provided a substantial volume of data for determination of water yield from various sections of the valley.

The water yields at a number of stream gauging stations in the Manning Valley, in terms of average flows over the period of records, are shown in Table 6, together with the numbers of complete years of computed records on which the averages are based. Stations which are not shown in Table 6 include those where the periods of records are too short for averages to have any significance and those where, because of lack of information concerning stream heights or discharges, flow records are incomplete.

TABLE 6.

Stream	Station	Complete Years of Records	Average Annual Yield over Period of Complete Years of Records		
			Acre Feet Per Annum	Cusecs	Gallons Per Minute
Manning River	Tomalla	11	33,800	46	17,300
Barnard River	Barry	11	60,000	82	30,700
Nowendoc River	Nowendoc	21	72,300	99	37,000
Nowendoc River	Rocks Crossing	22	569,000	779	291,000
Gloucester River	Forbesdale	19	89,200	122	45,700
Barrington River	Bobs Crossing	15	26,600	36	13,600
Barrington River	Forbesdale	22	319,000	436	163,000
Gloucester River	Doon Ayre	20	593,000	800	303,000
Manning River	Killawarra	20	2,078,000	2,800	1,060,000

Details of monthly maximum, minimum and mean flows for the gauging stations located on the Barrington River at Bobs Crossing and Forbesdale, on the Gloucester River at Doon Ayre and Forbesdale, on the Manning River at Killawarra and Tomalla and on the Nowendoc River at Nowendoc and Rocks Crossing are tabulated in Appendices 13 to 20 inclusive.

7. AVERAGE ANNUAL RUNOFF.

As continuous streamflow records for the Manning River Valley are available for only a relatively short period, the current estimate of long term average annual runoff of the valley has been partly based on streamflow correlations with both the Clarence River and Lower Hunter River Valleys for which streamflow

details have been recorded since 1922 and 1913 respectively.

On this basis the average annual runoff from the Manning River Valley has been assessed as being of the order of 1,800,000 acre feet per annum which is equivalent to a continuous rate of flow of about 2,460 cusecs or about 920,000 gallons per minute. On a square mile of catchment area basis these resources are about 40 percent greater than the average for Coastal New South Wales and are equivalent to about six times the average for the Australian mainland.

The volume of annual runoff represents approximately 23 percent of the average annual rainfall of 46 inches over the valley and may be compared with the estimated runoff statistics for the adjoining catchments of the Hastings and Lower Hunter River Valleys as set out in Table 7.

TABLE 7.

Valley	Catchment Area in Square Miles	Estimated Long Term Average Annual Runoff		
		Acre Feet Per Annum	Acre Feet Per Annum Per Square Mile	Percentage Runoff
Manning River	3,250	1,800,000	554	23%
Hastings River (including Stewarts River and Camden Haven River)	1,750	1,000,000	570	19%
Karuah River	850	500,000	590	23%
Lower Hunter River (below Maitland)	1,150	530,000	460	22%

A previous estimate of the long term average annual runoff for the Manning River Valley was given in the 1963 publication "Review of Australia's Water Resources," as 1,760,000 acre feet per annum. This estimate was based on the period of records of 11 years at Killawarra as compared with the 20 years now available.

The average annual runoff of the Manning River Valley of 1,800,000 acre feet per annum is equivalent to an annual runoff of 10.4 inches from the entire catchment. When compared to adjacent valleys this runoff is slightly less than the estimated equivalent runoffs of 11.1 and 10.7 inches per annum for the Karuah River and the Hastings River Valleys respectively, but is considerably higher than the estimated runoff of 8.6 inches per annum from the Lower Hunter River Valley.

8. VARIABILITY OF STREAMFLOW.

Whilst average annual flows are suitable for comparison of long term yields from catchments they do not indicate the surface water resources which could be available in a particular year or the probable extent to which the valley's surface water resources could be utilised without the construction of conservation works.

In common with most other streams in New South Wales, flows in the Manning River and its tributaries exhibit a high degree of variability. An indication of the variability of streamflows at selected stations in the Manning Valley is given at Table 8. This table shows the maximum, minimum and mean discharges recorded at the selected stations over the periods of available records.

TABLE 8

Stream	Station	Period of Records	Recorded Discharges		
			Maximum	Minimum	Mean
Manning River	Tomalla	1944 to 1967	1,570 cusecs (587,000 gpm)	0.2 cusecs (75 gpm)	46 cusecs (17,300 gpm)
Nowendoc River	Nowendoc	1946 to 1967	11,300 cusecs (4,226,000 gpm)	1 cusec (374 gpm)	99 cusecs (37,000 gpm)
Nowendoc River	Rocks Crossing	1945 to 1967	78,000 cusecs (29,200,000 gpm)	2 cusecs (748 gpm)	779 cusecs (291,000 gpm)
Gloucester River	Forbesdale	1948 to 1967	20,500 cusecs (7,670,000 gpm)	0	118 cusecs (45,700 gpm)
Barrington River	Bobs Crossing	1944 to 1967	1,690 cusecs (632,000 gpm)	0	36 cusecs (13,600 gpm)
Barrington River	Forbesdale	1945 to 1967	48,500 cusecs (18,100,000 gpm)	4 cusecs (1,500 gpm)	436 cusecs (163,000 gpm)
Gloucester River	Doon Ayre	1945 to 1967	91,300 cusecs (34,100,000 gpm)	0.2 cusecs (75 gpm)	800 cusecs (303,000 gpm)
Manning River	Killawarra	1945 to 1967	234,000 cusecs (87,500,000 gpm)	4 cusecs (1,500 gpm)	2,800 cusecs (1,060,000 gpm)

The highest flood since the commencement of records at all stream gauging stations in the Manning Valley, with the exception of the station at Bobs Crossing on the Barrington River, occurred in February-March 1956. During this flood, peak discharges varied from 34 times the average daily flow of 46 cusecs for the Manning River at Tomalla to 168 times the average daily flow of 122 cusecs for the Gloucester River at Forbesdale. The recorded peak discharges ranged from 1,570 cusecs at Tomalla to 234,000 cusecs at Killawarra

with a variation of maximum flow per unit of catchment area of from about 78 cusecs per square mile for the Manning River at Tomalla to about 256 cusecs per square mile for the Gloucester River at Forbesdale.

Streamflow records for the gauging stations in the Manning Valley show that the station with the most marked variation in annual flow is the Nowendoc River at Rocks Crossing, where annual discharges have ranged from about 6 percent to about 330 percent of the mean annual value.

The smallest variation in annual flows is that exhibited by the Manning River at Tomalla, with a range of 28 percent to 185 percent of the mean value.

Monthly streamflows always exhibit a greater variability than annual discharges. The greatest and least variations in monthly flows are exhibited by the Nowendoc River at Rocks Crossing and the Manning River at Tomalla, with the range at Rocks Crossing being from about one percent to over fourteen times the mean monthly flow, and that at Tomalla being from about seven percent to about five times the mean value.

Variations in monthly flows are illustrated graphically as monthly discharge hydrographs of streamflow for the Manning River at Killawarra and the Nowendoc River at Rocks Crossing at Figure 18 whilst similar graphs for the Barrington River at Forbesdale and the Gloucester River at Doon Ayre are given at Figure 19.

The maximum monthly runoff recorded in the Manning Valley occurred during June 1950, when the monthly discharge at Killawarra was 2,200,000 acre feet. This is equivalent to an average flow of 36,200 cusecs or about thirteen times the average flow of 2,800 cusecs.

Generally the period of lowest flows in the Manning Valley is experienced in the months September to November with October being the month of lowest flow at most stream gauging stations.

The most sustained period of low flow on record occurred during the drought which commenced in 1964. In this drought period all stream gauging stations recorded their minimum consecutive twelve monthly flows since establishment, the twelve monthly runoff at Killawarra, from December 1964 to November 1965, of 182,000 acre feet being only about 9 percent of the average annual flow.

9. PERSISTENCE OF STREAMFLOWS.

Flow in the majority of streams in the Manning River Valley tends to continue for significant periods of time after the cessation of rainfall. The conclusion which may be drawn from this is that contributions to streamflow from groundwater are relatively high and of extended duration.

A procedure commonly employed to enable comparison of streamflow persistence to be made between stations is the preparation of graphs showing flow duration curves. These curves indicate the cumulative percentages of time that discharges have varied over a selected range of recorded flows. Flow duration curves are constructed to show the percentages of time that flows were equal to or greater than (or alternatively equal to or less than) any selected discharge. The flow duration curves and data given in this report correspond to the percentages of time that flows were equal to or greater than a particular discharge.

An indication of the persistence of dry weather flows in the Manning Valley may be obtained from an examination of flow duration curves which have been prepared for the stream gauging stations at Tomalla and Killawarra on the Manning River, at Rocks Crossing and Nowendoc on the Nowendoc River, at Forbesdale on the Barrington River and at Doon Ayre on the Gloucester River.

The flow duration curve for the Manning River at Tomalla is shown at Figure 20. A summary of frequencies of particular flows during the period of records at this station is given in Table 9.

TABLE 9.

Percentage of Time Flow Equalled or Exceeded	Corresponding Flows	
	Cusecs	Gallons Per Minute
10%	90	33,700
30%	44	16,500
50%	29	10,800
70%	19	7,110
90%	8	2,990
95%	4	1,500
100%	0.2	75

The flow duration curve for the Nowendoc River at Nowendoc is shown at Figure 21 and flow frequency statistics for this station are given in Table 10.

TABLE 10.

Percentage of Time Flow Equalled or Exceeded	Corresponding Flows	
	Cusecs	Gallons Per Minute
10%	180	67,300
30%	68	25,400
50%	37	13,800
70%	20	7,480
90%	7	2,620
95%	4	1,490
100%	1	374

At Figure 22 the flow duration curve for the Nowendoc River at Rocks Crossing is shown and the flow data corresponding to this curve are given in Table 11.

TABLE 11.

Percentage of Time Flow Equalled or Exceeded	Corresponding Flows	
	Cusecs	Gallons Per Minute
10%	1,400	524,000
30%	360	135,000
50%	185	69,200
70%	90	33,700
90%	37	13,800
95%	22	8,230
100%	2	748

The flow duration curve for the Barrington River at Forbesdale is appended at Figure 23 and the flow frequency statistics for this station are given in Table 12.

TABLE 12.

Percentage of Time Flow Equalled or Exceeded	Corresponding Flows	
	Cusecs	Gallons Per Minute
10%	730	273,000
30%	308	115,000
50%	175	65,500
70%	104	38,900
90%	40	15,000
95%	22	8,230
100%	4	1,500

The frequencies of flow during the period of records for the Gloucester River at Doon Ayre are shown in Table 13 whilst the duration curve for this station is appended at Figure 24.

TABLE 13.

Percentage of Time Flow Equalled or Exceeded	Corresponding Flows	
	Cusecs	Gallons Per Minute
10%	1,550	580,000
30%	480	180,000
50%	242	90,500
70%	145	54,200
90%	51	19,100
95%	28	10,500
100%	0.2	75

The flow duration curve for the Manning River at Killawarra is appended at Figure 25 and flow frequency data for this station are indicated in Table 14.

TABLE 14.

Percentage of Time Flow Equalled or Exceeded	Corresponding Flows	
	Cusecs	Gallons Per Minute
10%	5,000	1,870,000
30%	1,450	542,000
50%	770	288,000
70%	390	146,000
90%	150	56,100
95%	80	29,900
100%	4	1,500

Whilst the flow duration curves shown at Figures 20 to 25 inclusive indicate the frequency of various flows at the particular stations they do not permit a comparison to be made of the relative flow duration characteristics of the various sub-catchments in the valley.

To enable these comparisons to be made, the flow duration curves for the six stations have been replotted in the form of duration curves per square mile of catchment area and are shown at Figure 26.

The curves at Figure 26 indicate that of the six selected stations, the Manning River at Tomalla exhibits by far the highest persistence of flow per square mile of catchment.

This is to be expected as Tomalla has the smallest catchment area of the six stations, being only 20 square miles, and yields per square mile usually increase as the catchment area decreases.

The difference in the flow characteristics of Tomalla and the remaining five stations could also be influenced by the fact that the period used to compute the flow frequencies at Tomalla was only about 11 years whereas the periods used for the remaining stations were fairly uniform ranging from 20 years for both the Gloucester River at Doon Ayre and the Manning River at Killawarra to 22 years for the Nowendoc River at Rocks Crossing.

It would therefore appear that of the major tributaries within the Manning River System, the Barrington and Manning Rivers which rise in elevated areas near Barrington Tops, exhibit the best persistence of flow whilst the Nowendoc River, which drains a large proportion of the northern section of the Manning Valley, has the least flow persistence.

Figure 26 also shows that the Nowendoc River at Rocks Crossing has a lower persistence of flow per square mile than that exhibited by the Manning River at Killawarra which has a catchment area of approximately three times that of Rocks Crossing. As the Manning River at Killawarra includes flow contributions for the higher yielding catchments of the Gloucester River and its associated tributaries, it is apparent that these flows, together with those originating in the upper reaches of the Manning River, are of sufficient magnitudes to elevate the flow persistence curve per square mile at Killawarra above that at Rocks Crossing.

10. OCCURRENCE OF FLOODING.

On the average, rainfall is fairly well distributed throughout the year but the late summer and autumn months are generally the wettest, and the spring months the driest. Most of the flood producing heavy rains in the Manning Valley have been registered in January, February and March but there are records of major floods occurring in several other months of the year.

In the Manning Valley the major damage arising from flooding is generally restricted to the low lying areas located below Taree towards the mouth of the Manning River. With the exception of minor low lying areas, the residential sections within the Municipalities of Taree and Wingham are above maximum recorded flood heights. Their situation at present in regard to flooding is that, even under maximum recorded flood conditions, serious damage is unlikely, but access to these towns is cut.

In the upper valley above Wingham flood damage has been mainly confined to roads, communications and fencing.

However, in the lower valley the area likely to be inundated during major floods has been assessed by the Public Works Department to be in excess of 50,000 acres. The flooding problem in these areas has been accentuated by high tides which tend to impede the passage of floodwaters into the ocean. The backwater which results from this restriction of flow causes floodwaters to overflow into the low areas.

The most downstream location on the Manning River for which reasonably reliable long records of flood heights or flood flows are available is the gauging station at Killawarra. This station which is situated about 5 miles upstream of Wingham commands a catchment corresponding to about 80 percent of the entire Manning Valley.

Since the commencement of records in 1945, the maximum flood height recorded at Killawarra was 49 feet 6 inches during the 1956 flood. However, a height slightly in excess of 60 feet was reported to have been reached at this station in February 1929. A diagram indicating the magnitude and occurrence of floods equal to or greater than 20 feet on the Killawarra gauge since the commencement of records in 1945 is appended at Figure 27.

In the period since 1945, floods at Killawarra have occurred more frequently in February than in any other month of the year, whilst no flood greater than 20 feet has been recorded in the month of September. The monthly distribution of recorded floods at Killawarra with peak flood heights equal to or greater than 20 feet is shown in Table 15.

TABLE 15.

Number of Floods above Twenty Feet - Manning River at Killawarra.

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
4	7	4	3	4	6	3	4	0	2	2	1

Apart from the flood level recorded in February 1929, the Commission has not obtained any records of flood heights at Killawarra prior to the establishment of the stream gauging station at that site in 1945. Nevertheless, some records have been obtained by the Public Works Department for flood heights at various locations on the lower Manning River. These indicate that the February 1929 flood is the highest on record at Taree, but at Wingham the maximum flood height in 1866 was reported to be about six feet higher than in 1929.

The highest flood flow recorded at selected stream gauging stations since the commencement of records at each station is given in Table 16.

TABLE 16

Stream	Station	Catchment Area (Square miles)	Highest Recorded Flood Flow		
			Date of Occurrence	Estimated Peak Flow	
				Cusecs	Cusecs Per Square Mile
Nowendoc River	Nowendoc	84	February 1956	11,300	135
Nowendoc River	Rocks Crossing	720	February 1956	78,000	108
Gloucester River	Forbesdale	80	March 1956	20,500	256
Barrington River	Forbesdale	243	February 1956	48,500	200
Gloucester River	Doon Ayre	620	March 1956	91,300	147
Manning River	Killawarra	2,530	March 1956	234,000	92

Table 16 indicates that the gauging station on the Gloucester River at Forbesdale which has a catchment area of only 80 square miles has recorded the highest runoff per square mile of the selected stations. However, this result is to be expected as peak runoff intensities per square mile normally decrease with increase in catchment area during a particular storm.

The most recent floods in the Manning Valley occurred in October 1967 and January 1968, when, as a result of heavy rainfalls associated with a tropical cyclone off the New South Wales coast most streams in the Manning Valley experienced substantial rises.

In October 1967, the Manning River at Killawarra rose to a peak height of 40 feet 1 inch, the peak discharge of about 135,000 cusecs representing a runoff of about 53 cusecs per square mile.

The January 1968 flood reached a peak height at Killawarra of 48 feet 6 inches, being only about one foot lower than the 1956 flood at the station. The peak flow of about 221,000 cusecs in the January 1968 flood is the second highest which has occurred at Killawarra since records were commenced in 1945 and represents a runoff of about 87 cusecs per square mile of catchment area.

Substantial flood flows were also recorded at upstream gauging stations in the January 1968 flood. On the Nowendoc River at Rocks Crossing the peak discharge was about 65,000 cusecs whilst peak discharges of about 24,000 cusecs and 12,000 cusecs occurred in the Gloucester River at Doon Ayre and the Barrington River at Forbesdale respectively.

11. DROUGHT PERIODS.

There does not appear to be any universally accepted definition of the term "drought". In general it is accepted as a period of rainfall deficiency at any location but such a criterion is inapplicable to locations where water supplies are drawn from streams which may originate in distant catchments.

A drought is considered to occur when the soil moisture is insufficient for the requirements of most crops during the growing season or when water shortages for domestic, industrial or municipal purposes are experienced. Normally a prime indicator of drought conditions is a diminished or exhausted rate of streamflow.

A graph depicting annual rainfalls recorded at Taree and Gloucester is appended at Figure 28. This graph indicates that the lowest calendar year rainfall was 23.89 inches at Taree in 1901 and 19.60 inches at Gloucester in 1964. The most prolonged sequence of below average falls at Gloucester occurred over the period from 1935 to 1946 inclusive and this period appears to have been the most critical since 1890 for the Manning Valley. As indicated at Figure 28 other shorter sequences of low annual rainfalls have occurred but these periods have been relieved to some extent by the occurrence of reasonable rainfalls in preceding or following years.

As the stream gauging station at Killawarra measures runoff from about 80 percent of the Manning River Valley and as streams entering the Manning River below Killawarra have much lower yield characteristics than the streams which rise in the elevated areas, the streamflow behaviour of the Manning River at Killawarra is indicative of the runoff from the entire Manning Valley.

The monthly hydrograph of streamflow for the Manning River at Killawarra over the period of available records from June 1945 to December 1967 is appended at Figure 18. Examination of Figure 18 shows that since the commencement of regular recording of streamflow of the Manning River at Killawarra the longest period of below average flow occurred from January 1964 to February 1967. During this 38 month period the total runoff was about 1,180,000 acre feet or an equivalent average flow of 510 cusecs, which is only about 18 percent of the average flow of 2,800 cusecs.

The lowest twelve monthly flow recorded on the Manning River at Killawarra since installation of the station in June 1945 occurred over the period from December 1964 to November 1965 inclusive when only 182,000 acre feet was

recorded. This discharge represents only about nine percent of the average annual flow or about 250 cusecs (94,000 gallons per minute).

Minimum twelve monthly discharges recorded since the commencement of records at Rocks Crossing and Doon Ayre also occurred during the 1964-1966 drought. At Rocks Crossing, the twelve monthly flow from January to December 1966 was 34,700 acre feet whilst at Doon Ayre the minimum twelve monthly flow was 50,000 acre feet from December 1964 to November 1965.

Available streamflow records indicate that on occasions the majority of streams within the Manning Valley have been reduced to extremely low flows whilst at several stations the flow has ceased completely.

The lowest flow recorded at the Manning River at Tomalla is 0.2 cusecs (75 gallons per minute) which occurred for only one day in March 1965. However, the lowest thirty day flow was recorded from 1st to 30th December, 1957 during which period the total flow was only 144 acre feet. This is equivalent to an average flow of about 2.4 cusecs (900 gallons per minute).

The Nowendoc River at Rocks Crossing, over the period of available streamflow records, has never ceased to flow. However, in December 1965 the flow receded to as low as 2 cusecs or less than one half of one percent of the average flow. The lowest thirty day flow at this station occurred during December 1946 and January 1947 when a total of only 480 acre feet was recorded.

Although the flow of the Gloucester River at Doon Ayre has not ceased, it has become very low on several occasions. In December 1957 and April 1965 the flow at Doon Ayre diminished to 0.2 cusecs or one fortieth of one percent of the average flow of 800 cusecs.

Of the stream gauging stations in the Manning Valley, only two stations, the Gloucester River at Forbesdale and the Barrington River at Bob's Crossing, have completely ceased to flow. The periods of no flow at Forbesdale were 90 days from November 1951 to February 1952 and 13 days from March to April 1965. At Bob's Crossing the period of no flow was only two days in January 1947.

The minimum recorded flows for periods of 30 days and 60 days for selected stream gauging stations in the Manning Valley, over their respective periods of operation, are shown in Table 17.

TABLE 17.

Stream	Station	Minimum Recorded Flow (Acre Feet)	
		30 Days	60 Days
Manning River	Tomalla	144 (December 1957)	474 (November to December 1957)
Nowendoc River	Nowendoc	117 (December 1946 to January 1947)	518 (April to June 1965)
Nowendoc River	Rocks Crossing	480 (December 1946 to January 1947)	1,528 (October 1946 to December 1946)
Gloucester River	Forbesdale	0 (November to December 1951)	0 (November 1951 to January 1952)
Barrington River	Bobs Crossing	96 (December 1946 to January 1947)	254 (November 1946 to January 1947)
Barrington River	Forbesdale	506 (December 1957)	1,478 (November to December 1957)
Gloucester River	Doon Ayre	161 (December 1957 to January 1958)	1,235 (November 1957 to January 1958)
Manning River	Killawarra	1,400 (November to December 1957)	6,730 (November 1957 to January 1958)

12. THE 1964-1966 DROUGHT.

From April 1964 to June 1965 a period of extremely low rainfall was experienced over the Manning Valley. The twelve monthly rainfall of 16.98 inches at Taree from May 1964 to April 1965 is the lowest twelve monthly rainfall recorded since the commencement of records in 1881.

Minimum twelve monthly rainfalls were also recorded at several other rainfall stations during this drought. At Comboyne the twelve monthly rainfall from June 1964 to May 1965 of 27.47 inches was considerably less than the previous twelve monthly minimum of 31.91 inches recorded from September 1908 to August 1909.

The minimum twelve monthly rainfall at Gloucester since the commencement of records in 1889 also occurred during the 1964-1966 drought. From July 1964 to June 1965 a total of only 15.28 inches of rainfall was recorded which may be compared with the previous minimum twelve monthly rainfall of 17.32 inches which occurred from March 1941 to February 1942.

The recorded monthly rainfalls at three selected locations in the valley since January 1964 are given in Table 18.

TABLE 18.

Month		Rainfall in Points		
		Gloucester	Comboyne	Taree
January	1964	266	538	285
February	1964	115	685	391
March	1964	297	1,046	764
April	1964	296	760	294
May	1964	70	108	41
June	1964	262	320	442
July	1964	40	129	51
August	1964	119	258	193
September	1964	48	68	39
October	1964	200	209	94
November	1964	74	206	186
December	1964	173	257	86
January	1965	297	298	171
February	1965	171	475	176
March	1965	51	47	18
April	1965	196	378	201
May	1965	66	102	254
June	1965	93	343	389
July	1965	340	1,344	496
August	1965	53	181	71
September	1965	132	159	213
October	1965	273	269	357
November	1965	115	343	97
December	1965	491	972	366
January	1966	88	230	398
February	1966	458	1,016	573
March	1966	276	442	350
April	1966	132	902	418
May	1966	131	162	127
June	1966	163	261	302
July	1966	21	12	7
August	1966	150	251	145
September	1966	107	204	279
October	1966	402	473	261
November	1966	604	696	487
December	1966	152	316	115
January	1967	414	1,033	677
February	1967	359	1,393	351
March	1967	722	1,279	753
April	1967	419	750	568
May	1967	201	297	386
June	1967	778	2,345	1,347
July	1967	35	181	124
August	1967	495	884	678
September	1967	166	349	161
October	1967	853	1,650	1,258
November	1967	108	342	230
December	1967	184	483	201
January	1968	1,494	2,536	1,373
February	1968	234	424	183
March	1968	746	712	733
April	1968	50	166	105
May	1968	425	356	167
June	1968	30	60	50
July	1968	194	248	221
August	1968	332	893	455
September	1968	93	134	58
Minimum Twelve Monthly Totals During Period		1,528 (July 1964 to June 1965)	2,747 (June 1964 to May 1965)	1,698 (May 1964 to April 1965)

Prolonged periods of low flow were experienced in the majority of the streams in the valley during the 1964 to 1966 drought.

On the Gloucester River at Forbesdale, flow ceased for a period of 13 days from March to April 1965 whilst a flow of 0.2 cusecs (75 gallons per minute) was experienced in the Manning River at Tomalla in March 1965 and in the Gloucester River at Doon Ayre in April 1965. The minimum flows recorded for the Manning River at Killawarra and the Barrington River at Forbesdale were 13 cusecs (about 4,900 gallons per minute) and 12 cusecs (about 4,500 gallons per minute) respectively.

Flows in the Nowendoc River during the 1964-1966 drought also were low. At Rocks Crossing, the flow became as low as 2 cusecs (748 gallons per minute) but only for a period of two days in December 1965, whilst in the months of November 1965, January, July and June 1966 the minimum flow recorded was only about 6 cusecs (2,250 gallons per minute).

A comparison of the minimum recorded 30 day flow and 60 day flow for selected streamflow stations during the 1964-1966 drought is given in Table 19.

TABLE 19.

Stream	Station	Minimum Total Flow During 1964-1966 (Acre Feet)	
		30 Days	60 Days
Manning River	Tomalla	224	513
Nowendoc River	Nowendoc	228	518
Nowendoc River	Rocks Crossing	784	2,740
Gloucester River	Forbesdale	69	207
Barrington River	Bobs Crossing	149	388
Barrington River	Forbesdale	866	2,578
Gloucester River	Doon Ayre	226	1,310
Manning River	Killawarra	1,480	6,980

As previously indicated, twelve monthly streamflows in the Manning Valley during the 1964-1966 drought have been the lowest since records commenced in 1944. The minimum twelve monthly flow recorded at selected stations during the 1964-1966 drought are given in Table 20.

TABLE 20.

Stream	Station	Minimum Twelve Monthly Flow (1964-1966 Drought)		
		Period	Acre Feet	Percentage of Mean Annual Flow
Manning River	Tomalla	October 1965 to September 1966	6,390	19%
Nowendoc River	Nowendoc	October 1965 to September 1966	6,510	9%
Nowendoc River	Rocks Crossing	January 1966 to December 1966	34,700	6%
Gloucester River	Forbesdale	July 1964 to June 1965	5,510	6%
Barrington River	Bobs Crossing	December 1964 to November 1965	8,650	34%
Barrington River	Forbesdale	December 1964 to November 1965	50,100	16%
Gloucester River	Doon Ayre	December 1964 to November 1965	50,000	9%
Manning River	Killawarra	December 1964 to November 1965	182,000	9%

The drought situation in the Manning Valley was improved during July 1965, when higher than average rainfalls fell at most locations in the catchment. This rainfall created minor rises in the streams within the Manning Valley and these are indicated by the streamflow records shown at Figures 18 and 19.

However, during July 1965, in the catchment to the north of the Manning River, the improvement in drought conditions was more evident than in the southern regions in the vicinity of Gloucester. This is reflected in the monthly streamflow records. On the Nowendoc River at Rocks Crossing about 55,000 acre feet or about 120 percent of the average monthly flow was recorded during July 1965. The monthly discharge for the Gloucester River at Doon Ayre during July 1965 was about 22,300 acre feet or only about 45 percent of the average monthly value and this indicated that drought conditions still persisted in the southern sections of the Manning Valley.

Rainfall from August 1965 until November 1965 was generally less than average and as a result the runoff from most streams tended to recede. However in December 1965 fairly substantial rainfalls were registered at most locations and as a result material rises in streamflow were recorded.

In February 1967 parts of the valley were subjected to heavy rainfall with Comboyne receiving nearly seven inches in 24 hours. High rainfalls were also experienced in March and June 1967. The peak flows resulting from the June 1967 rainfall were in excess of 20,000 cusecs at Rocks Crossing, about 14,000 cusecs at Doon Ayre and about 28,000 cusecs at Killawarra.

In October 1967 rainfalls were considerably greater than normal with the result that extremely high flows were recorded in most streams within the valley.

The rainfalls recorded in November and December 1967 were less than normal over much of the Manning Valley and by the end of December the flow at Killawarra had receded to well below the average value. However during January 1968 extremely heavy rainfall resulted in the Manning River at Killawarra rising to its second highest recorded level since 1945. Since January 1968 rainfalls have been sufficient to maintain streamflows in the valley at generally satisfactory levels.

13. WATER REQUIREMENTS FOR CURRENT DEVELOPMENT.

Dairying and beef cattle grazing are the main agricultural activities in the Manning River Valley. Dairying is usually confined to the better land on the river flats and country of more favourable topography. Beef cattle are also grazed on these areas in fairly large numbers but in the main this activity is undertaken on the less productive coastal sandy plains, or on the steeper ridges and dissected uplands. In several small areas within the valley, especially in the Barnard River catchment, sheep grazing for wool is the main rural activity with beef cattle grazing being a minor pursuit.

Maize, for grain production, is the valley's most important crop and is mainly grown on the better quality alluvial flats adjacent to the stream channels. The production of vegetables, citrus fruit and other crops within the Manning Valley is only a minor activity compared with dairying, beef cattle grazing and maize production.

The area authorised for irrigation by license under the Water Act has increased from 234 acres in June 1944 to 8,715 acres at June 1968, the corresponding number of licenses being 23 at June 1944 and 398 at June 1968.

Except for minor seasonal variations following wet and dry years, the rate of increase in both licensed area and the number of licenses over the period from June 1944 to June 1958 was fairly uniform. During this period the number of licenses for irrigation increased from 23 at June 1944 to 103 at June 1958, whilst the average acreage applicable to each license remained fairly constant at between 11 and 13 acres. However, since June 1958, the rate of increase of licensed area has been considerably greater, the average

acreage per license having increased to 22 acres at June 1968 when 8,715 acres were authorised for irrigation. A graph showing the growth in licensed area since 1944 is appended at Figure 30.

In addition to the irrigation licenses, a total of 54 licenses, permitting a diversion of approximately 6,500 gallons per minute, or about 17 cusecs, for town and commercial water supplies was current at the end of June 1968.

Up to the present time no major water conservation storages have been constructed in the valley. However, there are several schemes in operation to provide water supplies to various towns and their immediate environments.

The Manning District County Council is the authority responsible for providing water to the towns of Taree and Wingham and surrounding areas within the County District. At present the Council holds licenses for pumps on Dingo Creek and the Manning River to supply about 1,200 and 1,000 gallons per minute respectively. Construction is currently being undertaken on works to augment the existing Taree-Wingham Systems and also supply water to the towns of Tuncurry and Forster together with other villages within the Manning District County. It is envisaged these works when completed will increase authorised diversions by the Council for water supply purposes by about 2,900 gallons per minute.

The town of Gloucester obtains its water supply by pumping from the Barrington and Gloucester Rivers with the capacities of the pumps being 400 and 250 gallons per minute respectively. These works were installed prior to 1930 and are not required to be licensed under the Water Act.

The estimated maximum demands under present conditions for licensed irrigation, water supply and riparian usage (not including transmission losses) for the Manning Valley are given in Table 21.

TABLE 21

Type of Requirement	Estimated Maximum Demand	
	Cusecs	Gallons Per Minute
Irrigation (8,715 acres at 2 feet per season)	35.8	13,400
Town, Industrial and Stock Water Supplies	17.4	6,500
Riparian Usage	26.8	10,000
Total Demand	80.0	29,900

The areas authorised for irrigation on the Manning River and its tributaries at 30th June 1968, and the estimated total demands (including water supply and riparian usage but excluding transmission losses) are given in Table 22.

TABLE 22.

Stream	Area Authorised for Irrigation at 30th June 1968 (acres)	Estimated Total Demand	
		Cusecs	Gallons Per Minute
Manning River upstream of Gloucester River Junction	695	4.4	1,650
Barnard River and Tributaries	424	3.2	1,200
Nowendoc River and Tributaries	58	0.4	150
Minor tributaries of the Manning River upstream of Gloucester River Junction	0	1.7	640
Manning River downstream of Gloucester River Junction	949	10.0	3,700
Dingo Creek and Tributaries	1,450	17.6	6,570
Lansdowne River and Tributaries	110	3.6	1,350
Minor tributaries of the Manning River downstream of Gloucester River Junction	258	3.1	1,160
Gloucester River upstream of Barrington River Junction	1,430	10.4	3,890
Avon River and Tributaries	508	3.9	1,460
Minor tributaries of the Gloucester River upstream of Barrington River Junction	25	0.2	80
Gloucester River downstream of Barrington River Junction	614	4.4	1,650
Bowman River and Tributaries	448	4.0	1,500
Minor tributaries of the Gloucester River downstream of the Barrington River Junction	7	0.1	40
Barrington River	1,680	12.3	4,600
Arundel River	59	0.7	260
Totals	8,715	80.0	29,900

It should be noted that the foregoing requirements given in Tables 21 and 22 do not include any transmission losses due to evaporation and seepage. The evaporation losses from a stream can be quite substantial whilst the seepage losses are directly related to ground water conditions. Both losses can be expected to vary widely depending on streamflows and antecedent meteorological conditions.

14. POSSIBLE IRRIGATION DEVELOPMENT.

Any increase in the reliability of water supplies in the Manning Valley would result in greater stability of the agricultural enterprises of the valley. The provision of assured water supplies would not only permit an intensification of production from existing irrigated lands but would allow an increase in irrigation development of pastures, fodder crops and vegetables.

The extent of areas which appear suitable for irrigation has been determined with the assistance of aerial photographs. A summary of these areas is presented in Table 23 below.

TABLE 23.

Stream	Assessed Area Suitable for Irrigation (Acres)
Manning River above Gloucester River Junction	1,700
Minor tributaries of the Manning River above Gloucester River Junction	30
Manning River from Gloucester River Junction to the limit of tidal influence	1,800
Minor tributaries* of the Manning River between Gloucester River Junction and the limit of tidal influence	1,600
Manning River below the limit of tidal influence	13,000
Minor tributaries of the Manning River below the limit of tidal influence	7,100
Barnard River and tributaries	1,400
Nowendoc River and tributaries	2,400
Gloucester River upstream of the Barrington River Junction	2,200
Gloucester River downstream of the Barrington River Junction	550
Barrington River	2,700
Avon River	2,200
Bowman River and tributaries	920
Minor tributaries of the Gloucester River	1,500
Dingo Creek and tributaries	3,300
Lansdowne River and tributaries	5,600
TOTAL	48,000

Approximately 45 percent of the area assessed as suitable for irrigation lies along sections of streams within the limit of tidal influence. In the case of the Manning River the limit of tidal influence occurs about two miles above the town of Wingham.

It is not anticipated that the soils of the areas selected as suitable for irrigation will, in any way, prohibit the extent of irrigation development. The factors likely to limit the degree of irrigation development ultimately attained will be the quality of the surface water supply as governed by the extent of upstream penetration of tidal salt waters, the existing pattern of land sub-division and the periodic inadequacy of surface water supply to those suitable areas located within minor catchments.

In many areas in the lower section of the Manning Valley the topography is suitable for the construction of farm dams. In addition due to the temporal pattern of rainfall, farm dams could provide an economic source of water for supplemental irrigation in these areas.

Although relatively few farm dams have been constructed in the valley to date for irrigation purposes, it is expected that such storages will provide significant supplies of water for irrigation in the future.

15. INVESTIGATION OF STORAGE PROPOSALS.

The first survey of the Manning Valley was commenced in 1945 with the view of assessing the water requirements of the valley and the possible effects of the then proposed diversion of the headwaters of the Barrington River to the Hunter Valley. During this initial survey, dam sites on the Manning and Barrington Rivers and weir sites on the lower Manning River were selected. As a result of this survey, the need for a dependable stock and domestic water supply, (particularly along the tidal length of the Manning River) and the opportunity for intensifying fodder crop production through supplementary irrigation were recognised. Subsequent investigations were consequently directed towards the provision of a satisfactory water supply to those areas adjacent to the tidal length of the Manning River and of conservation storages on the Manning, Gloucester and Barrington Rivers.

Later, two alternative proposals for providing a dependable fresh water supply to the holdings adjacent to the tidal sections of the lower Manning Valley were advanced. The first proposal, a pipe reticulation scheme, was to supply under pressure 2,600 acre feet annually to a total of 387 holdings,

all holdings receiving 2 acre feet per annum for stock and domestic requirements and 364 holdings receiving an additional 5 acre feet per annum for irrigation purposes. Major works required for this scheme were a weir on the Manning River above Wingham with a storage capacity of approximately 500 acre feet, a pumping station within the weir pool, 2,300 feet of 30 inch diameter rising main connected to a 77 acre feet elevated storage reservoir and 100 miles of distribution pipelines. The location of the weir is shown in Figure 31.

The second proposal of local origin was for a barrage scheme. The scheme was to supply all requirements of 392 stream frontage landholders and an additional 102 inland landholders with a stock and domestic supply. Inland holdings were to be supplied through minor pipe reticulation systems. Major works required for this scheme were a barrage and navigation lock, the estimated storage capacity behind the barrage being about 50,000 acre feet. Two possible barrage sites were selected and were located approximately 2 and 4 miles above Harrington Inlet, the positions of these sites being shown in Figure 31.

Although the barrage scheme appeared to be less expensive than the pipe reticulation scheme it was not favoured because of possible increase in local flooding, the serious effect on the resident fishing industry and the periodic "break through" of the South Channel to the sea coast in times of flood. Present estimates of the pipe reticulation scheme indicate capital costs in excess of \$5.8 Million. As the maximum revenue that could reasonably be expected from this scheme would cover only operation and maintenance costs the scheme is not now considered economically sound.

Four dam sites, one each on the Gloucester and Manning Rivers and two on the Barrington River have been surveyed. The location of these sites is as shown in Figure 31. The upper dam site on the Barrington River commands an 8 square mile catchment on the Barrington Tops. This site was selected for the earlier proposed diversion to the Hunter Valley.

The long term plan for development of the State's water resources includes construction of storages for irrigation, stock and domestic purposes on the Barrington, Gloucester, Nowendoc and Manning Rivers at an estimated cost of \$10 Million and a weir (or barrage) on the lower Manning River. In addition the plan provides for construction of minor works which are considered desirable and which can be

justified by the benefits derived from these works.

As yet investigations of these storage proposals have been of a preliminary nature. However the lower dam site on the Barrington River about two miles downstream of the junction of Rawdon Stream, with a storage potential in excess of 38,000 acre feet, appears to be satisfactory. This should be sufficient to supply the water requirements of the landholders fronting the Barrington River and on the Gloucester River below the Barrington Junction.

It is anticipated that further investigations of the Gloucester River will yield a more suitable storage site on that stream, whilst there are a number of sites on the Manning River above the Nowendoc River Junction which appear more attractive than the site originally surveyed. No site has yet been surveyed on the Nowendoc River but the existence of a number of possible sites is evident from a study of aerial photographs. Storages on the Manning and Nowendoc Rivers will serve the lower Manning Valley.

A number of weir sites on the Manning River in the vicinity of Wingham have been investigated by independent authorities. However, the most promising site is the weir site as originally selected for the earlier pipe reticulation scheme. The superiority of this site was determined by seismic survey and foundation exploration.

To confirm the above conclusions it will be necessary to undertake extensive investigations including surveys of dam and weir sites and their storage basins, exploratory drilling of foundations and abutments and location and testing of construction materials.

16. ACKNOWLEDGMENTS.

The Water Conservation and Irrigation Commission gratefully acknowledges the assistance provided by the Director, Bureau of Meteorology, in supplying the section on climatic features, the Rainfall Statistical Data and the Median Rainfall Maps for inclusion in this report and by the New South Wales Public Works Department in providing details of the various town water supply schemes and the flood mitigation proposals in the lower Manning River Valley.

COMBOYNE RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1906	309	284	1316	579	615	76	53	1253	597	250	418	385	6135
1907	1081	560	1104	290	227	601	69	48	40	80	575	639	5314
1908	161	2576	1220	595	130	51	440	988	274	56	534	514	7539
1909	100	266	358	367	124	314	89	195	601	161	805	888	4268
1910	1128	204	1939	621	387	545	43	110	227	312	295	800	6611
1911	1722	1487	891	215	402	50	611	995	241	190	631	233	7668
1912	373	1815	914	256	104	305	815	308	0	130	371	494	5885
1913	469	669	215	2095	1909	1068	88	15	436	175	185	296	7620
1914	181	730	1178	130	394	1597	193	326	1660	1742	652	935	9718
1915	164	595	179	448	1610	80	133	276	57	168	58	531	4299
1916	352	731	470	1421	1179	125	80	139	128	504	322	947	6398
1917	558	548	641	273	171	176	30	65	508	200	1787	343	5300
1918	699	881	594	380	160	50	440	196	443	273	169	280	4565
1919	546	561	862	817	1485	168	348	36	137	434	479	340	6213
1920	876	614	478	276	165	159	407	29	471	384	585	524	4968
1921	1426	589	706	653	1384	760	1684	84	456	690	294	870	9596
1922	605	1446	187	195	563	313	1040	1010	1147	71	68	500	7145

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1923	382	118	620	1321	65	287	195	535	215	145	119	392	4394
1924	685	396	510	508	195	578	807	55	141	251	932	904	5962
1925	497	642	952	469	1087	1166	56	339	115	186	801	815	7125
1926	432	196	929	389	882	596	860	192	170	85	24	1462	6217
1927	923	529	542	1309	175	137	4	30	267	469	870	898	6153
1928	1006	1471	614	751	229	318	318	74	22	191	181	133	5308
1929	634	4855	1521	896	202	768	434	258	682	1498	425	150	12323
1930	417	673	1290	1068	473	3147	141	160	85	491	113	463	8521
1931	414	925	681	2682	268	186	136	156	173	199	573	1007	7400
1932	430	423	468	467	832	226	730	291	1068	312	505	129	5881
1933	1055	134	487	1181	144	1817	1683	83	1033	717	707	686	9727
1934	404	1612	1097	1057	502	86	1578	379	1302	291	337	1117	9762
1935	634	1486	871	241	112	58	628	44	785	183	172	732	5946
1936	836	588	1085	965	377	179	91	30	220	189	101	1781	6442
1937	814	938	1287	564	86	1593	309	285	63	643	1596	288	8466
1938	1513	1127	524	1488	997	82	220	304	311	223	353	62	7204
1939	982	23	2756	627	331	97	145	267	542	829	162	318	7079

COMBOYNE RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1940	322	175	689	397	212	102	92	352	301	347	274	937	4200
1941	1014	1219	418	348	234	214	300	131	28	244	343	137	4630
1942	213	1175	1891	92	37	537	473	36	54	2436	543	774	8261
1943	814	193	465	233	1866	69	44	631	418	303	1304	870	7210
1944	1014	597	548	224	168	168	490	1079	242	248	106	237	5121
1945	525	602	222	354	481	2098	742	109	160	195	931	414	6833
1946	263	878	1719	904	112	250	5	41	650	298	260	503	5883
1947	801	2091	820	951	506	265	33	51	117	297	824	1875	8631
1948	838	313	1135	165	1176	1627	123	154	849	34	234	304	6952
1949	744	1010	1745	457	259	370	1130	2227	538	401	528	283	9692
1950	1497	1205	511	1037	281	4034	1841	930	280	590	1350	1045	14601
1951	2777	475	1163	207	173	1985	28	154	178	214	76	120	7550
1952	356	1297	659	235	255	377	455	1451	42	584	241	368	6320
1953	880	1975	1475	443	532	7	126	285	163	153	223	169	6431
1954	975	2278	276	371	591	231	769	493	1598	1165	599	1078	10424
1955	1661	2454	1987	1073	796	252	189	0	288	622	371	1013	10706
1956	1711	3269	2420	241	933	1104	73	341	177	452	98	674	11493

COMBOYNE RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1957	378	2654	482	192	11	134	407	919	24	259	178	236	5874
1958	789	928	374	945	121	1217	53	509	431	213	53	869	6502
1959	2345	931	1596	476	215	579	537	698	302	909	1967	620	11175
1960	773	812	831	395	481	408	137	118	199	407	394	639	5594
1961	1000	1355	472	386	347	1201	118	284	438	799	628	679	7707
1962	1652	423	637	2406	821	44	904	296	232	279	228	1827	9749
1963	664	543	2376	1983	1923	726	169	312	1177	699	602	917	12091
1964	538	685	1046	760	108	320	129	258	68	209	206	257	4584
1965	298	475	47	378	102	343	1344	181	159	269	343	972	4911
1966	230	1016	442	902	162	261	12	251	204	473	696	316	4965
1967	1003	1395	1279	750	297	2345	181	884	349	1650	342	483	10956

COMBOYNE RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1895	601	191	52	96	68	79	40	65	184	71	317	508	2272
1896	364	614	106	11	152	156	117	166	40	229	346	189	2490
1897	242	31	4	41	22	229	346	169	100	160	7	575	1926
1898	414	525	74	38	195	591	126	283	118	182	102	155	2803
1899	229	22	35	504	83	201	189	484	122	157	197	183	2406
1900	109	32	146	211	317	219	414	35	48	20	308	353	2212
1901	92	60	347	242	119	192	111	232	65	328	189	150	2127
1902	257	128	63	48	9	30	118	117	246	295	212	394	1917
1903	20	11	247	166	362	212	242	395	466	659	369	373	3522
1904	37	771	290	390	118	75	502	84	128	174	22	77	2668
1905	75	145	393	465	116	130	85	123	17	160	146	97	1952
1906	34	120	382	60	111	32	86	190	322	128	329	65	1859
1907	NO RECORDS		277	96	56	350	29	142	42	22	400	610	
1908	136	1319	744	263	76	179	174	289	286	43	214	337	4060
1909	154	403	87	42	22	238	25	332	160	170	463	405	2501
1910	907	85	317	31	47	289	122	102	59	95	137	601	2792
1911	569	586	427	113	126	131	206	310	174	125	556	757	4080
1912	257	136	286	94	137	203	417	108	40	77	98	185	2038

GLENROCK RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1913	211	291	572	504	903	343	259	78	142	273	243	260	4079
1914	426	129	687	96	179	288	40	3	128	215	631	612	3434
1915	290	74	142	163	353	186	363	117	292	84	65	256	2385
1916	142	454	148	216	101	297	72	190	154	270	330	685	3059
1917	519	206	202	167	71	206	150	151	491	256	705	473	3597
1918	828	51	69	182	0	63	92	308	133	67	187	19	1999
1919	229	130	279	126	331	53	90	36	187	107	126	212	1906
1920	485	315	41	N.R.	60	310	248	163	260	80	297	302	
1921	101	50	668	386	416	439	505	15	280	400	360	931	4551
1922	400	348	0	63	66	146	510	311	246	92	10	680	2872
1923	80	20	40	57	0	377	260	143	NO RECORDS				
1924	450	383	71	270	58	75	378	160	274	242	759	209	3329
1925	194	245	86	53	133	164	41	206	19	60	349	516	2066
1926	169	10	594	146	226	15	200	122	101	43	48	748	2422
1927	311	22	154	248	9	69	30	26	59	129	482	204	1743
1928	396	656	352	129	47	492	405	0	59	232	156	125	3049
1929	243	1046	110	292	30	93	96	248	387	217	384	78	3224
1930	273	83	290	114	130	805	194	104	103	310	92	125	2623

GLENROCK RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1931	274	102	275	415	210	166	187	16	149	100	237	530	2661
1932	192	252	488	88	85	32	181	135	509	220	172	181	2535
1933	535	172	185	260	37	204	287	60	356	437	399	303	3235
1934	303	830	0	260	0	129	495	210	358	287	271	479	3622
1935	480	109	121	116	96	0	210	45	304	209	17	123	1830
1936	492	535	421	99	111	90	199	131	97	36	0	688	2899
1937	331	118	416	78	25	190	143	344	78	158	225	491	2597
1938	343	162	123	344	240	128	130	254	28	176	146	50	2124
1939	326	0	710	138	118	66	86	139	81	187	278	384	2513
1940	294	40	223	247	43	6	15	87	143	111	105	552	1866
1941	456	421	422	60	141	200	52	98	40	416	77	33	2416
1942	213	484	314	0	0	58	568	30	110	400	498	165	2840
1943	604	75	0	126	230	36	116	240	214	162	300	650	2753
1944	428	350	46	76	222	50	192	444	99	27	109	85	2128
1945	568	350	185	100	120	465	171	121	0	152	233	398	2863
1946	308	36	519	320	82	194	42	0	123	5	200	315	2144
1947	125	742	58	63	54	82	100	86	182	231	331	1044	3098
1948	265	398	61	129	106	438	62	157	326	36	169	401	2548

GLENROCK RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	
1949	494	610	165	328	77	342	313	197	465	256	469	348	4064	
1950	386	499	157	709	252	745	387	45	196	600	375	68	4419	
1951	700	195	65	146	0	419	147	182	0	38	64	76	2032	
1952	160	581	308	161	211	251	96	525	64	309	0	425	3091	
1953	195	513	327	65	465	150	0	268	54	150	104	76	2367	
1954	519	507	0	40	0	99	120	117	135	490	270	133	2430	
1955	384	1519	67	256	169	99	54	96	115	492	328	190	3769	
1956- 1959	NO RECORDS													
1960	NO RECORDS							89	182	273	272	389		
1961	158	323	163	71	54	116	95	255	120	237	490	652	2734	
1962	817	327	115	242	346	25	242	NO RECORDS			73	500		
1963	611	223	514	284	639	215	175	337	119	260	453	599	4429	
1964	494	65	338	461	37	215	156	99	105	226	180	186	2562	
1965	152	74	24	102	42	114	128	52	100	147	139	366	1440	
1966	106	207	223	165	160	202	32	198	77	406	423	NR		
1967	383	179	538	157	NO RECORDS									

GLENROCK RAINFALL STATISTICS
(Points)

GLOUCESTER RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1889	229	230	430	190	912	56	585	297	N.R.	285	582	568	
1890	920	1707	1056	273	520	261	1077	153	120	150	301	68	6606
1891	947	443	374	308	256	588	190	336	612	147	652	421	5274
1892	688	305	1111	724	60	23	65	302	449	580	649	890	5846
1893	552	1115	1942	134	151	871	363	357	189	928	482	298	7382
1894	153	341	1690	323	245	106	117	87	327	468	83	346	4286
1895	1390	467	125	100	105	0	6	53	185	53	515	475	3474
1896	394	912	324	32	349	233	77	139	79	235	454	536	3764
1897	247	39	152	261	263	390	369	137	28	152	94	1388	3520
1898	685	337	169	24	337	1097	253	228	557	238	67	408	4400
1899	218	175	53	635	200	269	638	1393	365	176	291	99	4512
1900	181	101	163	166	359	334	548	11	119	18	280	276	2556
1901	250	159	248	178	180	52	178	104	105	503	232	120	2309
1902	277	60	319	294	32	37	134	274	75	742	219	502	2965
1903	0	172	593	225	439	241	611	696	469	724	455	552	5177
1904	151	373	310	1099	210	0	717	48	54	142	224	246	3574
1905	130	223	241	505	158	23	24	99	11	73	263	845	2595
1906	65	164	632	42	215	13	8	811	286	118	241	125	2720
1907	408	186	464	108	149	287	0	0	0	14	316	513	2445

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	
1908	149	1389	692	272	18	16	217	385	200	27	175	285	3825	
1909	79	263	71	129	46	335	72	137	444	131	587	718	3012	
1910	515	129	769	129	188	377	25	71	94	172	83	562	3114	
1911	986	506	412	226	161	16	479	665	198	95	706	158	4608	
1912	208	470	698	171	150	196	551	108	54	78	228	607	3519	
1913	257	263	224	1113	1351	589	115	9	166	176	143	129	4535	
1914	184	240	499	151	214	429	96	113	556	663	571	691	4407	
1915	101	377	170	166	808	48	149	96	125	63	22	430	2555	
1916	218	308	191	412	738	176	90	65	107	256	344	800	3705	
1917	504	372	230	259	86	197	47	20	612	146	932	340	3745	
1918	738	323	171	319	78	53	138	127	149	196	66	101	2459	
1919	354	227	319	348	1017	73	128	10	169	152	210	345	3352	
1920	669	345	331	68	69	101	303	76	234	21	351	501	3069	
1921	600	323	619	609	628	508	875	30	335	420	270	856	6073	
1922	459	N.R.	59	NO RECORDS								24	305	
1923	242	10	105	383	20	213	156	246	194	175	76	331	2151	
1924	436	444	209	451	125	188	492	183	199	196	861	681	4465	
1925	384	250	301	178	510	417	44	283	62	105	389	488	3411	
1926	83	44	967	284	243	202	328	82	44	40	21	568	2906	

GLOUCESTER RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1927	429	80	518	750	72	61	10	23	69	286	692	561	3551
1928	461	323	345	292	101	1087	417	109	8	201	181	246	3771
1929	218	2963	177	491	94	49	262	196	409	810	420	89	6178
1930	282	164	692	351	193	1126	89	52	30	225	83	547	3834
1931	231	237	422	1278	337	86	187	38	137	91	300	529	3873
1932	236	458	533	209	161	128	507	142	693	211	383	250	3911
1933	420	73	206	353	44	319	694	36	452	572	446	624	4239
1934	161	639	150	631	263	64	709	377	474	257	258	502	4485
1935	756	394	305	55	48	105	116	140	506	157	70	297	2949
1936	511	297	523	211	96	94	72	28	69	102	0	845	2848
1937	475	159	687	227	25	469	197	153	55	220	505	278	3450
1938	752	296	305	574	332	91	72	272	68	113	334	65	3274
1939	396	124	1645	223	163	746	49	118	343	283	203	155	3748
1940	190	69	321	222	47	40	67	213	142	164	300	590	2365
1941	872	375	287	157	94	146	66	37	54	230	156	131	2605
1942	54	320	907	14	31	141	443	29	0	1030	489	324	3782
1943	577	91	126	86	626	39	36	266	280	308	674	601	3710
1944	512	365	196	110	113	96	233	427	109	27	134	148	2470
1945	538	503	52	174	177	863	290	100	66	164	308	434	3669

GLOUCESTER RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1946	151	205	1216	823	69	220	0	3	116	33	366	382	3584
1947	295	932	286	249	244	141	40	23	99	212	279	1282	4082
1948	329	154	581	123	344	505	51	121	476	10	218	152	3064
1949	604	796	497	361	71	421	549	404	520	407	360	140	5130
1950	340	744	252	462	341	1584	641	358	601	592	694	223	6832
1951	1868	321	576	74	82	941	29	117	66	107	16	81	4278
1952	134	782	389	249	221	227	261	805	12	426	133	215	3854
1953	397	767	768	76	385	7	109	139	43	100	181	195	3167
1954	352	1068	60	159	206	218	236	75	356	557	467	334	4088
1955	421	1488	673	763	300	52	20	3	55	405	299	675	5154
1956	339	1557	1428	51	541	367	86	162	71	198	52	203	5055
1957	136	768	682	67	0	89	146	286	39	49	59	142	2463
1958	597	546	359	203	73	384	91	99	222	121	34	620	3349
1959	633	723	989	201	83	215	251	396	197	700	506	525	5419
1960	622	478	413	146	169	272	112	32	212	267	203	300	3226
1961	652	466	260	188	184	389	55	306	119	392	339	570	3920
1962	822	633	277	881	622	7	204	127	111	220	131	1386	5421
1963	380	246	2124	785	927	267	139	256	386	204	288	531	6533
1964	266	115	297	296	70	262	40	119	48	200	74	173	1960
1965	297	171	51	196	66	93	340	53	132	273	115	491	2278
1966	88	458	276	132	131	163	21	150	107	402	604	152	2684
1967	414	359	722	419	201	778	35	495	166	853	108	184	4734

GLOUCESTER RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1908	NO RECORDS				143	174	196	476	396	185	304	301	
1909	367	363	174	117	80	390	176	435	220	197	416	802	3737
1910	959	131	556	128	149	401	219	168	182	181	212	637	3923
1911	1056	792	716	235	196	207	522	639	274	181	513	247	5578
1912	254	507	439	97	174	422	606	230	105	225	205	378	3642
1913	342	494	467	886	1039	571	292	147	262	239	235	236	5210
1914	275	284	797	129	368	502	125	87	289	519	699	715	4789
1915	293	112	146	79	735	325	382	168	365	144	63	441	3253
1916	218	529	220	398	337	425	156	331	212	345	506	771	4448
1917	534	230	224	131	110	244	259	213	543	347	880	501	4216
1918	861	218	224	421	137	62	215	486	166	156	75	57	3078
1919	470	331	278	248	689	122	121	110	177	146	177	392	3261
1920	546	354	117	59	149	463	325	411	399	184	307	488	3802
1921	278	181	777	543	791	471	1207	106	253	465	402	618	6092
1922	327	558	54	105	183	290	549	405	566	256	92	461	3846
1923	322	139	97	159	45	491	480	302	402	187	250	564	3438
1924	622	592	179	504	142	287	497	213	289	222	849	405	4801
1925	474	313	378	180	477	428	153	300	63	150	565	394	3875

GREENWOOD RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1926	290	95	655	412	457	192	448	179	209	73	71	885	3966
1927	649	44	345	567	89	152	106	124	125	304	683	359	3547
1928	741	842	339	436	55	779	426	54	103	191	216	248	4430
1929	237	1833	271	382	130	171	159	375	748	433	228	131	5098
1930	547	54	501	226	150	1370	314	300	79	436	156	296	4429
1931	354	167	307	931	309	280	246	136	221	118	251	648	3968
1932	223	286	460	187	205	150	216	192	832	168	309	356	3584
1933	924	219	161	290	83	327	638	51	622	460	641	413	4829
1934	287	757	131	373	225	138	751	424	607	370	332	739	5134
1935	524	352	313	148	113	86	326	115	480	325	70	207	3059
1936	484	456	647	285	194	121	356	160	140	75	29	686	3633
1937	474	783	701	199	119	337	236	579	98	342	407	383	4658
1938	491	354	132	573	370	198	262	350	112	404	381	87	3714
1939	624	20	888	424	233	92	163	365	240	335	323	293	4000
1940	347	51	241	293	56	54	92	168	217	152	163	531	2365
1941	768	254	361	145	177	271	70	142	114	335	200	61	2898
1942	87	547	490	10	98	174	527	63	160	1009	368	387	3920
1943	628	139	131	166	572	187	192	418	419	257	422	664	4195

GREENWOOD RAINFALL STATISTICS
(Points)

GREENWOOD RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	
1944	394	480	110	171	291	47	275	639	154	74	122	122	2879	
1945	580	450	114	221	281	1377	374	291	6	265	364	400	4723	
1946	315	154	698	435	133	268	65	32	187	37	201	300	2825	
1947	123	939	285	293	169	128	174	223	268	296	413	1453	4764	
1948	388	119	NO RECORDS				96	364	NO RECORDS					

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1910	761	75	835	240	271	355	25	44	104	287	153	568	3718
1911	1240	480	544	304	327	20	687	703	335	99	405	158	5302
1912	179	661	845	85	82	215	746	83	68	98	210	532	3804
1913	131	410	184	1047	1469	584	121	2	338	111	111	70	4578
1914	120	308	575	165	192	447	110	144	812	741	346	621	4581
1915	142	203	159	271	1013	80	148	127	95	102	8	412	2760
1916	174	453	346	669	644	160	82	91	206	264	383	480	3952
1917	604	118	285	220	120	140	26	26	653	201	909	286	3588
1918	597	370	124	452	87	60	175	147	270	115	80	80	2557
1919	305	313	327	357	1795	79	227	41	295	204	343	511	4797
1920	780	249	210	59	135	177	477	95	202	78	538	427	3427
1921	927	163	517	976	952	687	908	44	365	407	170	695	6811
1922	392	963	0	136	326	100	1137	420	976	125	20	225	4820
1923	244	55	72	664	10	245	292	275	207	140	105	597	2906
1924	621	344	121	505	85	214	579	195	224	182	677	605	4352
1925	428	392	356	225	726	471	59	374	25	130	424	427	4037
1926	129	196	1009	424	632	200	372	116	189	50	74	656	4047
1927	355	177	560	1525	228	90	17	17	114	250	829	596	4758
1928	447	527	253	383	152	1203	345	55	0	164	172	266	3967

KRAMBACH RAINFALL STATISTICS
 (Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1929	127	3248	335	564	116	110	315	195	518	922	501	131	7082
1930	148	462	1078	585	423	1312	39	88	40	300	118	459	5052
1931	233	368	772	1822	218	76	128	67	150	139	228	555	4756
1932	555	219	345	311	138	212	710	137	751	252	336	161	4127
1933	745	45	166	626	70	460	995	18	537	928	274	300	5164
1934	267	748	166	594	308	178	955	558	282	207	246	559	5068
1935	678	580	475	28	56	168	177	151	446	268	48	333	3408
1936	480	263	444	379	179	103	61	56	118	113	14	670	2880
1937	612	233	918	255	36	925	202	353	71	253	762	511	5131
1938	923	367	348	602	596	68	80	473	164	228	233	80	4162
1939	832	0	1169	401	128	45	38	189	351	503	244	226	4126
1940	136	46	517	246	59	67	65	417	201	297	460	652	3163
1941	764	577	282	172	85	240	103	218	13	201	122	151	2928
1942	51	444	799	42	66		NO RECORDS			970	299	372	
1943	526	71	289	110	1415		NO RECORDS		245	485	474	562	
1944	819	532	284	127	95	143	360	664	326	46	123	113	3632
1945	434	390	103	236	225	1596	441	82	159	68	NR	286	
1946	258	359	1324	859	207	121	0	16	130	34	142	312	3762

KRAMBACH RAINFALL STATISTICS
 (Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1947	382	1267	465	481	318	217	30	27	107	175	413	2245	6127
1948	368	266	769	166	564	665	124	123	412	41	73	188	3759
1949	400	709	662	397	200	706	597	653	698	486	447	174	6129
1950	881	812	141	428	262	2321	1072	640	296	372	621	130	7976
1951	2106	296	573	104	121	1111	23	145	117	200	21	96	4913
1952	253	1046	544	453	237	458	425	1348	0	410	84	284	5542
1953	562	NR	632	91	473	10	139	194	20	86	135	208	
1954	502	1618	249	197	310	0	0	0	0	666	424	434	4400
1955	732	1558	729	889	474	101	45	8	55	292	366	561	5810
1956	695	1985	1668	141	643	770	131	159	61	278	0	375	6906
1957	143	763	846	94	24	56	262	515	21	23	62	113	2922
1958	563	1007	419	674	149	688	36	197	434	155	52	942	5316
1959	1014	523	1486	191	84	289	439	368	385	766	595	498	6638
1960	461	893	545	122	213	527	125	31	153	198	415	376	4059
1961	499	744	378	212	278	496	59	284	255	471	364	796	4836
1962	917	300	627	1266	838	43	191	165	145	220	67	1335	6114
1963	318	196	3313	1204	1258	340	159	316	579	219	307	570	8779
1964	237	400	375	266	60	318	50	157	65	149	200	145	2422
1965	186	200	21	286	43	198	752	97	154	311	85	376	2709
1966	201	770	718	277	123	202	18	186	95	201	464	244	3499
1967	NO RECORDS												

KRAMBACH RAINFALL STATISTICS
 (Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1885						NO RECORDS					82	1005	
1886	498	108	250	401	438	366	899	122	328	109	402	503	4424
1887	299	1323	2225	1272	584	358	219	787	163	74	905	1267	9476
1888	203	1742	325	245	25	391	183	55	577	405	110	721	4982
1889	254	360	651	293	1011	63	894	787	1074	710	428	650	7175
1890						NO RECORDS							
1891	1518	763	525	609	469	933	347	313	750	231	556	760	7774
1892	419	1873	1404	1146	376	122	161	371	313	501	961	1459	9106
1893	494	1092	1274	376	145	1056	438	379	215	1160	391	533	7553
1894	617	736	2049	207	333	134	94	175	501	553	28	405	5832
1895	4023	1088	322	242	221	24	18	13	242	73	996	909	8171
1896	269	743	380	55	291	337	181	152	46	130	687	339	3610
1897	29	82	471	286	798	1684	305	376	87	33	71	1623	5845
1898	769	444	519	168	1224	1559	291	651	1138	386	109	528	7786
1899	304	308	153	447	721	426	1273	3738	812	547	261	341	9331
1900	331	538	153	312	628	1054	1119	15	118	83	378	304	5033
1901	454	211	420	250	589	473	477	135	112	386	357	205	4069
1902	256	157	535	1088	310	84	82	125	185	695	298	140	3955

MOORLAND RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1903	231	301	564	126	452	620	558	681	516	792	553	477	5871
1904	422	633	904	1445	264	9	827	175	63	237	112	397	5488
1905	171	532	205	1318	391	88	46	74	76	142	655	752	4450
1906	285	220	580	381	278	54	16	1164	491	200	584	288	4541
1907	810	404	1222	231	389	779	63	41	13	60	595	494	5101
1908	72	2243	826	595	118	43	685	686	290	84	775	365	6782
1909	110	339	235	474	251	396	86	212	572	161	622	804	4262
1910	582	202	1474	666	298	392	22	45	171	465	187	608	5112
1911	1335	835	940	591	363	43	822	718	348	210	719	175	7099
1912	391	954	733	286	183	287	1433	319	127	173	319	388	5593
1913	103	719	198	1343	1956	830	233	17	493	131	205	138	6366
1914	256	346	1195	129	471	1009	262	314	1153	1477	352	617	7581
1915	374	382	217	546	737	96	126	240	57	121	11	465	3372
1916	277	414	399	1119	955	152	107	205	131	304	302	746	5111
1917	577	412	567	508	209	213	42	57	493	307	1364	123	4872
1918	738	602	427	608	286	100	489	197	300	144	122	214	4227
1919	488	264	581	677	1605	266	300	31	234	284	199	222	5151
1920	845	454	339	226	354	182	475	27	176	287	429	746	4540

MOORLAND RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1921	1512	300	482	1070	799	625	756	95	470	619	171	876	7775
1922	541	1196	88	278	779	419	1383	893	906	181	60	219	6943
1923	272	33	258	1332	57	275	315	502	204	127	128	647	4150
1924	800	482	320	590	404	385	656	232	289	236	657	449	5500
1925	492	331	830	324	1311	625	74	539	80	274	607	304	5791
1926	377	287	919	346	589	565	1041	304	138	96	14	1146	5822
1927	507	310	849	2900	230	374	10	62	244	307	934	611	7338
1928	743	629	582	498	359	1193	459	162	1	248	227	138	5239
1929	528	3371	954	821	383	512	564	286	366	973	403	100	9261
1930	330	824	1167	1171	495	2423	194	122	41	455	75	352	7649
1931	405	447	674	2185	223	178	257	44	153	94	525	772	5957
1932	693	587	295	433	776	206	766	211	789	334	459	166	5715
1933	509	81	158	1452	70	891	1001	3	632	869	560	326	6552
1934	234	1235	353	1593	411	87	830	651	892	188	303	546	7323
1935	433	730	633	171	116	83	388	193	753	231	54	460	4245
1936	620	411	668	600	237	150	87	24	160	265	25	1003	4250
1937	765	194	1341	810	54	1767	335	288	24	407	921	216	7122
1938	1184	771	99	287	842	116	300	420	141	346	155	182	4843

MOORLAND RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1939	727	0	1514	513	182	76	115	272	303	493	123	320	4638
1940	317	69	305	390	103	46	111	293	207	472	190	1001	3504
1941	702	638	242	360	293	211	314	160	33	339	204	N.R.	
1942	0	588	1020	358	65	498	725	136	26	1468	602	191	5677
1943	0	576	441	263	745	30	36	858	782	398	891	750	5770
1944	N.R.	149	251	505	142	264	633	333	396	102	491	33	
1945	N.R.	405	375	514	376	1293	N.R.	90	13	189	516	N.R.	
1946	85	736	1314	1080	58	64	5	4	372	202	772	N.R.	
1947	465	2388	276	1620	652	394	74	39	141	N.R.	760	N.R.	
1948	0	754	515	182	1044	512	103	232	502	65	96	N.R.	
1949	N.R.	1331	1182	462	185	912	552	971	432	212	N.R.	N.R.	
1950	N.R.	94	104	714	309	1762	1427	720	176	514	998	433	
1951	2320	201	701	91	164	1181	7	109	233	275	71	148	5501
1952	220	1323	650	507	403	389	317	573	52	489	94	255	5272
1953	468	1145	865	293	370	4	116	310	59	97	92	160	3979
1954	552	1407	376	363	449	257	323	623	1053	667	278	267	6615
1955	737	1067	788	926	781	287	73	6	479	452	324	712	6632
1956	978	1597	1069	180	682	835	71	304	83	418	91	483	6791

MOORLAND RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1957	148	1329	383	121	134	114	351	927	47	46	46	140	3786
1958	417	842	411	506	135	937	10	334	336	204	126	651	4909
1959	1189	669	1087	419	217	520	627	388	418	805	1041	377	7757
1960	694	617	648	290	266	707	69	97	178	235	296	677	4774
1961	643	870	388	190	328	1228	154	293	160	453	463	443	5613
1962	992	357	588	1503	1159	41	422	195	165	243	111	550	6326
1963	406	368	2117	2182	1074	928	152	243	442	287	477	503	9179
1964	463	549	786	405	25	438	47	358	30	132	137	77	3447
1965	213	294	5	308	244	505	211	92	144	328	201	486	3031
1966	119	724	275	224	212	385	26	237	162	328	570	204	3466
1967	747	875	1018	550	330	1661	150	694	143	1195	255	427	8045

MOORLAND RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	
1840			NO RECORDS						35	275	230	375	830	
1841	1295	262	1145	143	893	316	192	115	0	75	365	72	4873	
1842	401	848	1943	905	391	33	1270	398	265	105	47	679	7285	
1843	102	1700	345	496	736	571	511	1557	527	37	150	107	6839	
1844	2099	728	95	114	534	300	538	819	243	69	399	525	6463	
1845	104	213	272	1269	446	25	70	38	375	281	252	1172	4517	
1846	186	205	472	546	76	252	351	333	552	111	716	348	4148	
1847	740	1279	658	498	718	50	60	10	243	286	205	32	4779	
1848	5463	870	1473	663	90	921	579	228	112	NR	106	461		
1849	75	233	225	427	1222	238	330	200	313	802	253	385	4703	
1850	422	280	469	1316	272	1229	768	518	1023	1036	419	351	8103	
1851	525	2017	725	1498	700	1230	358	465	NR	802	304	NR		
1852	969	340	1216	1667	3608	285	180	674	368	878	NO RECORDS			
1853 to 1869	NO RECORDS													
1870	NO RECORDS									838	858	498		
1871	1433	512	553	654	620	874	43	8	42	384	342	297	5762	
1872	411	762	590	330	47	68	51	144	684	448	535	654	4724	
1873	967	1901	718	754	190	771	547	360	170	174	631	2507	9690	

PORT MACQUARIE RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1874	891	513	351	575	71	247	636	313	144	322	318	127	4508
1875	193	1256	1207	584	1128	271	894	97	479	166	392	307	6974
1876	518	625	331	1969	1993	906	739	82	400	253	280	293	8389
1877	345	77	946	317	442	64	608	209	119	343	191	675	4336
1878	893	1881	446	746	181	296	89	247	425	171	199	676	6250
1879	232	860	553	397	1720	668	96	1512	788	64	242	805	7937
1880	257	909	786	789	132	76	171	0	1173	390	666	140	5489
1881	924	533	314	259	151	439	416	594	1283	760	322	109	6104
1882	22	549	181	146	315	939	335	133	43	730	420	1175	4988
1883	528	952	473	719	1211	73	502	305	250	433	209	211	5866
1884	43	311	100	803	310	208	1421	131	368	365	431	258	4749
1885	302	485	263	764	316	387	672	23	256	209	93	1607	5377
1886	757	52	338	703	394	879	940	193	529	364	277	113	5539
1887	574	1750	1461	1647	1119	512	190	1068	181	91	1819	2127	12539
1888	108	1092	306	222	44	265	273	105	877	488	149	1157	5086
1889	263	202	646	683	528	78	690	747	938	292	553	238	5858
1890	2168	1809	1447	913	681	314	635	247	265	175	643	822	10119
1891	725	1020	608	515	792	600	544	374	733	156	503	875	7445

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1892	652	1138	1410	1170	476	361	175	369	346	727	632	631	8087
1893	428	1025	1070	450	246	1128	261	340	128	753	370	183	6382
1894	464	521	1644	363	407	247	59	85	679	628	147	507	5751
1895	3294	1259	534	277	233	41	47	67	303	96	767	970	7888
1896	310	704	441	56	404	290	127	177	114	150	763	224	3760
1897	142	198	456	346	939	1753	337	256	114	68	124	1195	5928
1898	737	583	417	291	772	1657	400	293	1055	161	157	659	7182
1899	209	502	601	226	800	540	876	3053	731	583	497	251	8869
1900	195	161	173	297	1801	857	1075	17	92	63	527	465	5723
1901	455	411	289	418	865	413	725	217	117	637	161	131	4839
1902	412	198	425	490	157	137	72	303	185	686	329	212	3606
1903	448	251	671	152	517	775	698	760	458	487	457	981	6655
1904	765	632	725	1544	331	13	931	275	61	245	107	60	5689
1905	406	719	311	1232	808	83	23	59	50	137	209	219	4256
1906	234	274	699	589	432	141	27	903	867	151	292	540	5149
1907	953	675	644	112	591	862	41	43	3	134	243	397	4698
1908	138	1762	807	455	165	57	494	746	198	52	513	178	5565
1909	95	374	673	510	218	327	199	143	521	146	628	621	4455

PORT MACQUARIE RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1910	840	248	1125	659	257	403	2	75	34	353	163	469	4628
1911	956	1052	1071	234	502	60	592	735	312	255	514	235	6518
1912	274	836	571	328	186	387	1409	132	57	169	326	334	5009
1913	239	507	72	1263	1690	1369	365	32	519	220	79	110	6465
1914	91	539	1361	175	849	1075	266	329	1170	1652	349	484	8340
1915	179	173	151	274	1044	96	131	208	56	138	24	416	2890
1916	224	446	849	1355	965	144	102	308	172	257	352	661	5835
1917	337	694	663	602	399	168	41	157	402	335	932	338	5068
1918	735	599	555	693	272	27	396	228	378	210	112	284	4489
1919	461	681	590	512	1110	393	289	13	72	511	183	237	5052
1920	672	438	471	314	442	245	427	36	259	325	531	395	4555
1921	1019	233	364	587	981	749	815	102	583	488	117	789	6827
1922	485	1610	70	283	779	412	1001	742	798	118	112	347	6757
1923	526	374	260	1254	124	141	459	570	291	168	114	602	4883
1924	413	342	622	560	422	207	471	227	132	244	737	388	4765
1925	375	270	822	762	1373	509	42	529	70	173	404	478	5807
1926	105	62	639	182	452	631	624	250	146	43	6	698	3838
1927	974	627	612	1870	53	411	4	100	307	598	736	406	6698

PORT MACQUARIE RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1928	969	990	328	511	441	1234	349	123	7	183	199	145	5479
1929	375	3325	697	877	522	603	363	293	458	1126	296	40	8975
1930	453	960	1317	1546	906	2565	326	165	55	340	147	318	9098
1931	212	317	446	1988	203	254	278	77	86	106	410	814	5191
1932	243	319	291	347	593	137	547	62	671	470	183	194	4057
1933	840	128	270	1385	27	1598	1205	76	1041	740	335	249	7894
1934	163	939	621	1236	557	44	989	487	1003	161	320	537	7057
1935	454	760	1062	158	352	102	269	646	739	153	88	451	5234
1936	447	557	918	336	261	226	96	54	281	474	41	903	4594
1937	1033	740	1723	907	51	1135	475	177	73	259	1563	239	8375
1938	839	851	176	420	1231	118	436	448	167	327	163	76	5252
1939	399	7	966	444	360	105	157	424	177	441	128	118	3726
1940	177	61	800	715	151	86	122	182	161	338	148	661	3602
1941	794	489	448	607	226	219	422	84	48	307	291	64	3999
1942	84	1030	777	103	54	425	532	65	59	976	492	618	5215
1943	495	68	235	191	1370	20	34	609	377	439	845	886	5569
1944	501	278	306	118	64	439	579	570	101	143	129	227	3455
1945	248	198	121	444	510	1359	506	132	53	229	737	265	4802
1946	352	576	911	1240	62	27	3	8	208	221	259	536	4403

PORT MACQUARIE RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1947	566	847	481	725	495	203	13	83	166	217	637	1306	5739
1948	484	247	1164	205	482	848	90	107	537	66	183	218	4631
1949	667	774	849	515	323	682	874	860	643	302	421	292	7202
1950	451	1177	575	842	724	1640	3048	1063	395	515	1295	887	12612
1951	902	497	905	205	453	1195	17	174	73	169	54	98	4742
1952	166	862	590	474	619	434	560	1223	135	720	162	111	6056
1953	439	1316	920	560	734	23	164	350	63	302	97	133	5101
1954	372	1626	539	324	704	230	300	891	1401	454	297	271	7409
1955	401	1028	973	823	1175	294	149	11	408	384	183	845	6674
1956	1119	1589	666	274	703	919	78	371	95	220	69	372	6475
1957	137	1314	654	259	69	168	489	1015	61	149	47	152	4514
1958	702	379	917	1207	113	674	52	513	376	251	59	564	5807
1959	1582	669	949	609	318	579	593	350	316	1094	871	677	8607
1960	941	723	529	402	259	570	142	57	157	211	279	530	4800
1961	792	1216	501	718	422	898	100	204	148	667	639	266	6571
1962	2170	474	1058	1915	1082	26	708	567	211	332	272	818	9633
1963	612	373	1603	2438	1505	1037	61	391	291	384	720	746	10161
1964	323	665	752	519	192	483	139	450	92	231	230	125	4201
1965	247	266	38	769	293	566	237	173	355	740	461	940	5085
1966	203	832	361	439	327	673	244	336	245	228	759	130	4777
1967	929	574	838	1031	312	1864	150	646	209	803	182	555	8093

PORT MACQUARIE RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year	
1881				NO RECORDS							143	194	216	
1882	85	510	205	182	390	569	152	141	44	425	205	204	3112	
1883	493	667	153	484	1336	125	240	222	186	318	155	179	4558	
1884	77	96	10	535	422	257	1265	27	194	303	225	80	3491	
1885	269	324	142	411	180	393	358	48	109	243	64	503	3044	
1886	493	174	102	234	255	103	711	131	235	128	588	492	3646	
1887	353	1791	866	1513	266	240	203	700	187	63	484	1297	7963	
1888	159	1152	52	92	38	283			NO RECORDS					
1889							NO RECORDS							
1890	1079	2135	1429	285	654	220	642	90	112	41	169	182	7038	
1891	403	311	487	117	192	824	177	282	165	40	654	520	4172	
1892	419	1873	1404	1146	115	97	110	306	70	479	700	1348	8067	
1893	125	878	1103	211	113	751	203	342	168	729	180	240	5138	
1894	705	733	1609	294	134	75	56	29	333	633	40	321	4962	
1895	3024	1140	205	101	188	11	2	28	235	73	941	713	6661	
1896	210	795	263	64	231	293	101	66	181	179	477	721	3581	
1897	112	49	161	317	317	832	205	196	86	46	21	1854	4140	
1898	298	437	192	119	346	1179	235	601	919	242	47	323	4938	

TAREE RADIO STATION RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1899	314	231	197	586	348	223	1057	2569	668	276	274	92	6835
1900	177	357	199	218	663	809	811	5	126	39	303	216	3923
1901	329	58	180	240	245	183	379	111	66	311	185	102	2389
1902	233	97	227	466	46	30	107	115	171	568	150	232	2442
1903	192	508	678	180	280	496	432	656	317	644	476	479	5338
1904	122	531	546	1100	195	14	551	99	39	175	63	217	3652
1905	43	322	341	958	164	33	5	60	103	70	202	528	2829
1906	263	111	396	318	246	25	0	871	210	213	599	205	3457
1907	680	243	772	205	164	355	80	15	1	47	321	414	3297
1908	33	1730	900	270	39	47	528	457	155	57	338	300	4854
1909	101	293	148	204	95	408	47	114	503	112	459	631	3115
1910	638	35	1083	229	317	328	3	43	208	312	130	468	3794
1911	1450	573	549	294	296	23	668	704	220	255	378	196	5606
1912	307	932	701	100	158	161	851	86	78	63	195	510	4142
1913	127	484	140	1169	1600	614	183	8	506	143	70	112	5156
1914	203	386	1388	69	321	862	170	181	1072	1302	344	511	6809
1915	206	376	92	259	1079	52	135	145	61	105	11	403	2924
1916	206	432	258	1200	799	159	97	152	139	270	280	621	4613

TARFE RADIO STATION RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1917	421	393	420	217	163	150	39	39	864	311	921	271	4209
1918	648	603	238	418	137	55	315	191	386	78	193	153	3415
1919	315	394	332	498	1374	184	237	29	208	185	151	253	4160
1920	957	338	314	137	211	126	391	16	127	161	315	452	3545
1921	1036	156	511	964	870	803	869	57	397	482	165	738	7048
1922	316	1070	30	112	474	189	1313	694	1070	151	12	184	5615
1923	311	37	283	1078	100	209	368	495	172	148	223	472	3896
1924	743	338	113	411	104	280	476	184	233	143	732	710	4467
1925	336	151	463	346	1094	454	66	404	28	185	492	390	4409
1926	172	156	717	418	502	295	643	154	53	44	7	978	4139
1927	460	129	389	1693	209	255	2	18	94	225	813	555	4842
1928	640	359	478	600	220	1143	313	68	0	138	197	114	4270
1929	335	3109	399	834	130	270	478	264	546	918	375	60	7718
1930	260	563	1344	838	326	1827	137	54	27	381	145	362	6264
1931	357	389	539	1925	363	119	188	34	163	64	516	481	5138
1932	358	368	377	258	371	178	792	172	708	290	559	138	4569
1933	573	41	173	771	186	703	1138	12	582	679	339	259	5456
1934	204	616	246	1354	385	51	949	497	756	203	324	421	6006

TAREE RADIO STATION RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1935	535	555	674	15	69	48	348	108	606	134	63	361	3516
1936	442	229	527	269	181	211	71	32	149	98	27	722	2958
1937	950	269	1112	371	40	1035	192	260	22	245	693	513	5702
1938	1329	578	215	555	923	44	117	429	245	262	177	71	4945
1939	775	6	1021	340	77	57	58	216	314	452	244	133	3693
1940	171	62	591	501	72	14	115	289	189	311	120	765	3200
1941	648	666	481	275	71	177	150	151	10	211	237	160	3237
1942	44	332	697	91	62	331	482	4	36	1122	266	225	3692
1943	397	104	279	131	1198	62	34	516	408	272	468	488	4357
1944	562	281	248	85	90	134	399	730	111	57	138	136	2971
1945	177	221	153	192	363	1324	518	81	44	149	411	201	3834
1946	120	211	1146	810	83	92	0	0	0	187	195	248	3092
1947	238	1034	479	410	432	176	32	49	141	167	350	1587	5095
1948	692	211	986	142	669	626	74	93	403	34	93	199	4222
1949	435	837	702	315	119	767	796	665	481	324	416	170	6027
1950	625	818	120	549	225	1845	1280	624	299	407	863	170	7825
1951	2122	279	961	124	167	1087	17	106	100	182	21	112	5278
1952	138	977	621	385	188	325	267	935	15	431	146	181	4609

TARRE RADIO STATION RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1953	476	1032	623	134	432	14	87	251	45	112	104	176	3486
1954	353	1482	584	345	295	319	405	312	751	536	545	400	6327
1955	815	1478	946	867	562	121	77	3	184	347	353	360	6113
1956	753	1491	1315	253	556	726	93	259	121	245	92	260	6164
1957	163	801	663	113	29	64	296	670	33	18	54	91	2995
1958	359	710	517	712	279	735	33	439	371	211	61	705	5132
1959	855	720	981	251	103	353	320	365	267	634	760	337	5946
1960	626	372	469	179	251	395	83	103	120	282	235	443	3558
1961	393	644	387	309	193	704	87	187	200	407	364	514	4389
1962	965	202	413	1765	1162	35	442	187	91	313	106	980	6661
1963	546	179	2794	1682	1170	757	142	296	582	314	476	548	9486
1964	285	391	764	294	41	442	51	193	39	94	186	86	2866
1965	171	176	18	201	254	389	496	71	213	357	97	366	2809
1966	398	573	350	418	127	302	7	145	279	261	487	115	3462
1967	677	351	753	568	386	1347	124	678	161	1258	230	201	6734

TAREE RADIO STATION RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1908		NO RECORDS			48	33	428	482	146	44	335	285	
1909	89	265	70	159	85	331	54	135	616	191	409	710	3114
1910	782	84	848	197	245	333	37	42	96	302	132	633	3731
1911	1064	478	464	236	366	99	745	572	214	133	380	146	4897
1912	150	635	514	102	98	195	693	107	70	130	201	574	3469
1913	108	888	150	1244	1503	717	166	21	227	223	173	84	5504
1914	134	370	732	113	311	601	76	141	787	751	407	585	5008
1915	276	186	124	221	768	76	182	160	131	125	5	330	2584
1916	168	377	290	667	726	162	88	75	118	270	376	771	4088
1917	550	295	258	309	98	180	21	36	544	123	1078	432	3924
1918	724	393	156	322	91	62	206	168	245	117	72	109	2665
1919	373	229	439	419	1170	115	60	32	186	127	316	496	3962
1920	847	277	310	97	109	169	411	103	247	74	422	454	3520
1921	760	260	459	583	919	524	954	52	295	396	174	577	5953
1922	450	826	28	149	318	89	1127	435	957	91	40	305	4815
1923	205	22	60	436	19	322	314	229	149	108	95	560	2519
1924	554	495	131	441	120	164	407	165	265	133	775	615	4265
1925	471	393	347	281	616	406	63	347	63	167	390	430	3974
1926	245	226	813	262	454	212	313	111	131	43	37	701	3548

WATERLOO KRAMBACH RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1927	576	204	441	1703	298	66	14	26	103	259	621	742	5053
1928	512	485	264	333	202	1208	344	133	11	152	96	243	3983
1929	86	3312	321	488	123	148	302	166	451	843	394	95	6729
1930	185	469	895	546	311	1080	82	81	24	330	104	413	4520
1931	295	220	1194	1795	246	104	159	89	143	51	215	588	5099
1932	185	199	330	382	251	198	615	196	892	214	258	220	3940
1933	803	39	158	674	50	328	896	28	534	732	264	598	5104
1934	320	721	168	717	409	65	1105	353	528	156	236	558	5336
1935	568	627	446	37	40	44	220	158	450	162	55	363	3170
1936	498	229	437	366	138	113	58	35	173	121	22	712	2902
1937	474	143	804	273	53	806	160	263	35	408	688	343	4450
1938	943	293	258	553	461	100	117	424	148	137	307	48	3789
1939	710	2	1276	332	144	39	48	165	333	328	179	273	3829
1940	185	31	496	223	50	57	53	374	184	280	281	880	3094
1941	931	457	248	248	107	234	99	116	14	146	211	88	2899
1942	45	394	825	47	59	170	477	80	10	1028	267	208	3610
1943	297	45	236	96	1158	51	19	411	284	342	434	416	3789
1944	710	434	394	131	76	189	262	500	248	53	56	195	3248
1945	289	651	53	269	169	1099	274	73	55	251	397	236	3816

WATERLOO KRAMBACH RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1946	151	303	1252	871	92	90	0	15	93	62	270	249	3448
1947	236	1156	417	377	299	197	26	34	130	157	442	2016	5487
1948	335	263	611	118	480	507	88	188	415	46	67	207	3325
1949	477	668	669	285	139	758	643	360	630	477	216	100	5422
1950	491	664	30	393	179	1812	783	522	275	374	497	152	6172
1951	1578	328	469	137	191	1108	119	159	196	52	65	104	4506
1952	269	906	635	516	167	292	210	861	0	364	189	227	4636
1953	20	793	456	124	348	0	101	62	0	105	99	60	2168
1954	335	1249	275	52	27	171	328	337	370	603	500	160	4407
1955	375	595	840	645	740	147	5	7	45	265	178	450	4292
1956	481	2233	2836	63	417	333	84	100	8	60	0	168	6783
1957	40	818	129	139	0	64	170	438	48	0	23	151	2020
1958	160	682	503	450	25	653	53	111	439	73	55	934	4138
1959	603	668	1275	75	110	26	250	470	395	215	0	0	4087
1960	496	613	522	121	98	26	250	463	835	615	0	0	4039
1961	155	577	250	200	95	605	45	115	312	86	349	484	3273
1962	836	209	494	1093	663	2	100	0	165	0	27	1228	4817
1963							NO RECORDS						
1964	452	299	216	118	225	58	356	273	114	308	220	142	2781
1965							NO RECORDS						
1966							NO RECORDS						
1967	450	NO RECORDS	929	565	NO RECORDS		34	756	254	925	131	242	

WATERLOO KRAMBACH RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1891	651	799	586	196	364	868	195	284	506	85	285	687	5506
1892	514	1210	1503	1200	488	131	186	654	285	573	556	896	8196
1893	460	1290	1562	396	129	1258	150	398	126	892	266	90	7017
1894	693	542	1922	436	107	107	19	71	204	655	37	296	5089
1895	2454	848	277	156	58	9	10	18	283	40	1262	1104	6519
1896	477	876	289	22	389	348	91	132	193	138	730	331	4016
1897	226	150	377	165	503	863	357	175	0	40	41	1065	3962
1898	815	583	498	135	885	1670	238	278	1027	219	153	335	6836
1899	282	288	457	195	448	385	1023	2418	632	493	307	189	7117
1900	313	101	92	205	1156	714	775	20	83	37	235	621	4352
1901	553	161	408	207	595	292	152	152	32	589	220	155	3516
1902	288	182	552	377	49	65	41	110	141	592	215	232	2844
1903	170	181	854	97	322	961	533	433	375	465	438	677	5506
1904	393	398	357	1173	252	4	833	104	61	235	134	108	4052
1905	178	559	275	1027	383	78	33	42	9	129	297	550	3560
1906	188	110	823	453	378	61	3	889	318	437	322	89	4071
1907	495	432	475	55	304	402	8	36	0	97	329	321	2954
1908	86	1792	639	251	57	31	167	654	160	34	408	271	4550

MAUCHOPE RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1909	98	309	289	340	54	252	65	80	266	136	526	619	3034
1910	901	106	1317	586	178	344	0	13	27	323	188	441	4424
1911	1103	1181	506	139	226	0	661	721	263	272	644	218	5934
1912	161	1382	550	173	45	264	906	158	50	135	387	462	4673
1913	162	370	93	1127	1195	714	120	42	452	208	78	176	4737
1914	186	346	1212	125	358	784	170	177	1443	1684	337	417	7239
1915	251	197	72	239	1256	38	124	152	34	115	22	430	2930
1916	185	364	418	1375	668	76	10	207	86	313	169	865	4736
1917	290	279	283	211	307	154	28	61	369	319	1007	181	3489
1918	621	768	310	263	229	59	348	148	171	185	80	304	3486
1919	331	309	717	504	1193	236	120	3	72	262	131	160	4038
1920	652	416	357	131	149	236	256	30	162	247	462	393	3491
1921	1402	179	444	672	1225	598	864	72	387	505	114	783	7245
1922	425	1212	38	81	499	234	1219	746	681	167	95	327	5724
1923	246	181	289	1195	29	264	302	412	226	91	84	350	3669
1924	718	460	270	492	317	251	505	112	138	250	627	305	4445
1925	425	432	692	382	1221	650	18	298	30	182	544	610	5484
1926	207	147	639	112	482	382	557	158	46	47	5	828	3610

WAUCHOPE RAINFALL STATISTICS
(Points)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1927	811	253	244	1451	50	106	10	15	175	595	887	505	5102
1928	923	584	413	369	192	1273	288	84	0	417	205	104	4852
1929	373	4575	678	647	295	504	321	106	592	1131	161	49	9432
1930	393	802	956	1115	469	2370	189	140	134	264	65	265	7162
1931	196	418	668	2083	221	112	189	42	90	35	573	684	5311
1932	339	226	386	340	368	108	574	83	662	311	694	123	4214
1933	1525	44	281	1191	27	1834	1289	27	901	614	239	381	8353
1934	130	1216	425	1537	525	19	1168	504	795	183	198	459	7159
1935	431	1065	817	107	51	13	456	79	801	166	101	481	4568
1936	475	615	782	391	166	109	80	15	194	111	16	1320	4274
1937	652	487	1033	333	14	832	242	133	7	290	1294	171	5488
1938	1191	905	196	701	784	32	158	370	112	158	188	49	4844
1939	604	0	1101	330	94	90	68	266	346	533	166	139	3737
1940	224	96	639	210	52	55	24	159	148	320	268	883	3078
1941	437	544	294	151	116	112	312	39	24	182	339	28	2578
1942	23	651	698	104	50	347	292	34	31	1428	524	575	4757
1943	660	70	224	119	1897	9	34	547	424	216	860	705	5765
1944	853	202	215	59	86	146	586	731	84	70	217	141	3390
1945	323	304	181	190	414	1273	585	119	179	154	850	268	4840

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1946	241	477	1369	843	52	10	3	7	178	266	180	426	4052
1947	367	1071	471	740	518	80	26	44	93	139	617	1528	5694
1948	465	151	1227	113	645	814	71	97	425	52	170	274	4504
1949	569	1130	806	289	278	462	753	1105	372	333	481	317	6895
1950	974	868	306	675	176	1929	1875	999	277	521	1357	516	10473
1951	1249	313	884	128	265	1155	9	119	75	148	56	315	4716
1952	245	1088	595	153	266	524	424	1329	42	381	109	148	5304
1953	650	1408	653	147	538	4	98	249	29	111	142	106	4135
1954	286	1793	292	264	356	217	335	305	1050	716	657	552	6823
1955	726	864	823	887	717	74	36	0	199	447	154	1046	5973
1956	753	2175	1039	348	545	922	31	167	63	185	53	548	6829
1957	272	1040	428	104	2	55	213	493	13	112	75	123	2930
1958	406	569	727	722	91	958	3	421	285	138	33	373	4726
1959	1282	744	1300	248	166	287	554	306	408	730	1256	533	7814
1960	561	557	506	299	279	417	77	59	138	211	341	258	3703
1961	269	993	333	396	304	804	75	105	76	811	275	289	4730
1962	1290	388	438	2150	1061	9	720	288	92	258	282	958	7934
1963	409	190	1744	2532	1324	743	53	237	476	302	531	594	9135
1964	440	699	782	464	39	316	98	329	62	216	201	173	3819
1965	93	317	8	192	141	338	301	137	50	812	191	609	3189
1966	217	538	365	678	78	256	9	193	157	289	639	78	3497
1967	790	634	749	586	143	1539	88	719	190	908	274	288	6908

STATISTICAL RAINFALL DATA
(Points)

Station	Rainfall Statistics	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Comboyne (Period 59 Years)	Minimum	100	23	179	92	11	7	4	0	0	34	24	62	4200
	10%	263	196	358	207	108	58	43	36	42	130	98	150	4584
	30%	432	560	524	354	175	168	118	110	163	199	223	340	5946
	50%	699	730	820	469	331	305	195	258	267	279	371	531	6833
	70%	975	1205	1135	896	563	596	473	339	456	452	585	870	7707
	90%	1652	2278	1891	1421	1384	1627	1040	995	1068	829	932	1078	10706
	Maximum	2777	4855	2756	2682	1923	4034	1841	2227	1660	2436	1967	1875	14601
Taree Radio Station (Period 75 Years)	Minimum	33	6	30	15	29	11	0	0	0	18	7	60	2389
	10%	124	83	158	108	70	32	26	16	28	47	44	112	2985
	30%	237	264	282	216	154	121	87	78	99	142	149	201	3693
	50%	358	389	481	294	225	223	188	172	171	211	237	337	4409
	70%	625	648	698	511	363	462	400	298	315	311	376	492	5290
	90%	960	1275	1214	1155	985	931	827	667	684	633	696	728	6819
	Maximum	3024	3109	2794	1925	1600	1845	1313	2569	1072	1302	941	1854	9486
Waterloo- Krambach (Period 54 Years)	Minimum	20	2	28	37	0	0	0	0	0	0	0	0	2020
	10%	99	65	97	86	45	42	24	27	13	52	23	86	2782
	30%	221	262	258	154	98	100	79	81	111	119	96	201	3534
	50%	374	394	438	283	174	176	163	138	191	157	213	353	3979
	70%	552	631	518	439	333	332	308	246	323	275	363	567	4578
	90%	842	897	1045	794	754	943	764	467	623	609	499	757	5496
	Maximum	1578	3312	2836	1795	1503	1812	1127	861	957	1028	1078	2016	6783

STATISTICAL RAINFALL DATA
(Points)

Station	Rainfall Statistics	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Port Macquarie (Period 84 Years)	Minimum	22	7	70	56	27	13	2	8	3	43	6	40	2890
	10%	138	186	208	179	91	51	38	49	56	112	84	112	4028
	30%	306	374	447	326	291	186	141	127	116	174	162	236	4821
	50%	452	580	617	514	447	390	343	238	231	276	292	392	5567
	70%	687	849	815	722	714	617	538	408	399	440	475	620	6545
	90%	972	1315	1241	1370	1147	1215	936	810	872	729	750	937	8738
	Maximum	3294	3325	1723	2438	1801	2565	3048	3053	1401	1652	1819	2127	12612
Wauchope (Period 74 Years)	Minimum	23	0	38	22	2	0	0	0	0	34	5	28	2578
	10%	174	129	220	106	50	12	10	19	26	61	55	107	3234
	30%	284	296	345	182	158	98	70	80	80	151	158	245	4052
	50%	428	482	502	332	304	258	178	150	167	241	253	343	4733
	70%	651	825	722	545	485	561	395	293	302	357	450	549	5709
	90%	1147	1253	1284	1198	1175	1207	849	726	672	686	855	890	7530
	Maximum	2454	4575	1922	2532	1897	2370	1875	2418	1443	1684	1357	1528	10473
Moorland (Period 70 Years)	Minimum	0	0	88	55	25	4	7	3	1	33	11	77	3372
	10%	150	161	206	172	104	43	37	27	46	85	61	141	3988
	30%	308	349	384	291	241	139	112	128	139	183	131	293	4883
	50%	465	543	580	440	373	370	295	241	233	279	311	454	5645
	70%	636	769	829	649	587	603	476	367	462	442	545	638	6737
	90%	1165	1328	1334	1435	1005	1168	898	780	810	784	904	906	7785
Maximum	4023	3371	2225	2900	1956	2423	1433	3738	1153	1477	1364	1623	9476	

MINIMUM RAINFALL RECORDED IN CONSECUTIVE PERIODS OF UP TO TWELVE MONTHS
COMMENCING IN THE MONTH INDICATED
 (Points)

Station	Number of Months	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Comboyne	1	53	23	47	92	11	7	4	0	0	34	24	62
	2	122	522	382	129	145	113	34	88	120	109	196	350
	3	226	891	527	337	316	171	157	168	279	410	552	815
	4	1091	1002	819	650	346	438	237	468	527	766	977	1077
	5	1215	1345	1226	715	613	709	631	601	944	1139	1283	1455
	6	1529	1518	1356	1223	1065	772	770	1096	1513	1492	1661	1557
	7	1618	1713	1673	1355	1187	1126	1126	1771	1560	1870	1763	1900
	8	1813	2314	1917	1842	1466	1610	1900	1818	1938	1972	2016	2132
	9	2414	2475	2260	1979	1844	2220	1947	2196	2040	2315	2469	2327
	10	2575	2941	2397	2192	2328	2867	2325	2298	2383	2722	2821	2928
	11	3263	3616	2610	3367	2375	2645	2427	2641	2996	2917	3122	3089
	12	4200	3829	3785	3135	2753	2747	2770	3984	3191	3518	3469	3581
Taree Radio Station	1	33	6	30	15	29	11	0	0	0	18	7	60
	2	161	194	142	84	76	13	0	0	48	51	133	204
	3	322	395	423	132	175	41	0	63	104	163	271	366
	4	566	649	505	302	175	92	143	258	196	453	544	451
	5	820	838	507	330	175	271	377	405	537	695	637	652
	6	1099	973	535	565	362	473	538	576	752	731	838	906
	7	1206	1088	770	638	557	722	676	752	770	932	1092	1201
	8	1321	1259	843	1038	805	960	996	770	971	1186	1386	1308
	9	1492	1767	1565	1355	1043	1375	1014	971	1225	1575	1493	1423
	10	2025	1794	1923	1486	1479	1456	1215	1225	1614	1804	1608	1594
	11	2210	2060	1967	1773	1497	1657	1469	1614	1870	1919	1779	2162
	12	2389	2293	2299	1791	1698	1911	1858	1981	1985	2090	2347	2312

MINIMUM RAINFALL RECORDED IN CONSECUTIVE PERIODS OF UP TO TWELVE MONTHS
COMMENCING IN THE MONTH INDICATED
(Points)

Station	Number of Months	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Waterloo-Krambach	1	20	2	28	37	0	0	0	0	0	0	0	0
	2	216	82	177	77	64	70	12	52	48	23	0	133
	3	287	377	268	121	160	102	57	165	68	174	155	489
	4	583	537	332	341	197	163	170	168	222	268	572	592
	5	668	857	502	499	290	260	252	326	276	663	632	882
	6	999	910	834	635	352	294	420	376	898	723	1068	1047
	7	1053	1099	988	740	622	427	460	1014	1223	1159	1087	1315
	8	1188	1468	988	839	775	762	1113	1323	1362	1178	1358	1368
	9	1653	1659	1011	899	1054	1347	1407	1462	1362	1418	1528	1742
	10	1846	1692	1162	1193	1454	1740	1546	1462	1426	1588	1921	1926
	11	1869	1941	1322	1702	2111	1879	1546	1526	1596	2026	2014	2014
	12	2020	2013	1950	2220	2296	1879	1610	1696	2034	2074	2014	2037
Port Macquarie	1	22	7	38	56	27	13	2	8	3	43	6	40
	2	167	303	327	157	89	30	11	46	137	49	152	131
	3	454	494	488	496	92	38	87	172	195	321	280	356
	4	777	766	837	598	100	215	221	423	394	487	484	665
	5	1213	1205	1110	665	308	352	464	568	560	925	874	1007
	6	1706	1479	1199	968	529	561	585	734	1046	1066	1329	1322
	7	1891	1782	1502	1064	788	780	751	1182	1167	1510	1644	1950
	8	2194	1967	1598	1769	1324	1014	1205	1679	1611	2020	2111	2022
	9	2312	2271	2122	2268	1745	1288	1818	2181	2121	2628	2183	2325
	10	2450	2295	2538	2352	2096	1987	2493	2691	2854	2799	2486	2510
	11	2474	2711	2762	2592	2493	2576	2880	3043	2937	2981	2671	2911
	12	2890	2935	3086	2937	3262	3008	3066	3070	3158	3142	3039	2958

MINIMUM RAINFALL RECORDED IN CONSECUTIVE PERIODS OF UP TO TWELVE MONTHS
COMMENCING IN THE MONTH INDICATED
 (Points)

Station	Number of Months	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Wauchope	1	23	0	8	22	2	0	0	0	0	34	5	28
	2	298	193	119	106	57	13	10	36	40	52	198	51
	3	418	398	341	161	65	20	40	133	81	310	390	459
	4	610	562	500	233	72	162	141	256	323	572	625	695
	5	751	708	510	251	250	291	407	612	596	994	1002	900
	6	1089	1076	528	534	418	485	722	635	1062	1008	1207	1360
	7	1300	1235	811	574	691	739	877	1286	1070	1200	1526	1415
	8	1459	1383	851	1067	1086	1025	1358	1399	1262	1341	1581	1439
	9	1577	1699	1495	1190	1175	1436	1497	1591	1403	1679	1605	1598
	10	1889	1971	1597	1326	1796	1813	1689	1732	1741	1908	1764	1746
	11	2195	2141	1620	1977	1852	2005	1830	2070	2042	2117	1912	2066
	12	2578	2164	2271	2316	2044	2146	2168	2371	2179	2167	2232	2334

MANNING RIVER AT TOMALLA

LOCATION: Latitude 31°52' Longitude 151°33'

PERIOD OF ESTABLISHMENT: March, 1944 to date.

COMPLETE YEARS OF COMPUTED RECORDS: 11

ZERO OF GAUGE: R.L. 42.88 Assumed Datum.

CATCHMENT AREA: 20 Square Miles

CONTROL: Gravel

EQUIPMENT: Automatic Recorder (Float type)
Installed January 1954.
Staff gauge, range 0 to 14 feet

CURRENT METER OBSERVATIONS:

- (a) Number obtained : 102
- (b) Maximum observation
in cusecs : 186
- (c) Minimum observation
in cusecs : 2.5

MAXIMUM ESTIMATED DISCHARGE DURING PERIOD OF RECORDS: 1,570 cusecs

MEAN DAILY DISCHARGE FOR 11 YEARS: 46 cusecs.

MEAN ANNUAL DISCHARGE FOR 11 YEARS: 33,800 acre feet

REMARKS: This station was established in 1944 but continuous streamflow records commenced in 1954.

MANNING RIVER AT TOMALLA

Year 1954

Year 1955

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	NO RECORDS				Jan.	357	12	39	2413
Feb.	NO RECORDS				Feb.	1068	29	157	8800
Mar.	NO RECORDS				Mar.	390	69	155	9638
Apr.	20	13	15	900	Apr.	443	49	102	6132
May	54	10	15	932	May	330	47	93	5769
June	208	14	31	1895	June	180	43	65	3886
July	371	15	69	4302	July	75	26	34	2116
Aug.	110	20	31	1963	Aug.	77	25	35	2144
Sept.	210	16	40	2410	Sept.	53	16	27	1622
Oct.	469	27	81	5050	Oct.	170	15	38	2326
Nov.	258	30	63	3792	Nov.	90	17	31	1890
Dec.	98	18	28	1722	Dec.	142	19	37	2296
Total	..	..	..	..	Total	..	..	..	49032

Year 1956

Year 1957

Jan.	195	9	24	1476	Jan.	53	9	14	886
Feb.	1570	46	231	13398	Feb.	195	10	28	1578
Mar.	894	113	200	12432	Mar.	180	18	32	1964
Apr.	226	37	68	4078	Apr.	52	15	19	1144
May	665	46	89	5536	May.	16	11	13	815
June	388	43	83	4989	June	37	10	12	748
July	240	41	77	4795	July	49	12	18	1132
Aug.	121	27	50	3120	Aug.	27	17	20	1270
Sept.	33	17	23	1374	Sept.	41	15	24	1412
Oct.	88	17	26	1606	Oct.	17	9	12	778
Nov.	71	12	20	1172	Nov.	14	2	5	330
Dec.	99	9	17	1046	Dec.	28	1	3	180
Total	..	..	..	55022	Total	..	..	..	12237

MANNING RIVER AT TOMALLA

Year 1958					Year 1959				
Month	Discharge in Cusecs			Discharge For Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	365	5	20	1250	Jan.	650	15	70	4368
Feb.	69	12	23	1268	Feb.	375	27	65	3642
Mar.	330	9	18	1142	Mar.	125	39	43	2680
Apr.	30	9	14	830	Apr.	39	29	37	2248
May	175	10	21	1288	May	43	19	24	1468
June	460	15	78	4672	June	25	17	19	1124
July	170	24	50	3078	July	445	17	87	5380
Aug.	99	23	32	1968	Aug.	260	39	70	4316
Sept.	63	21	28	1714	Sept.	223	43	65	3914
Oct.	220	23	53	3258	Oct.	188	41	61	3786
Nov.	205	14	35	2074	Nov.	633	42	119	7172
Dec.	60	11	17	1066	Dec.	73	24	39	2408
Total	..	..	..	23608	Total	..	..	..	42506

Year 1960					Year 1961				
Jan.	NO RECORDS				Jan.	135	25	44	2752
Feb.	NO RECORDS				Feb.	NO RECORDS			
Mar.	373	34	88	5444	Mar.	NO RECORDS			
Apr.	59	23	33	1980	Apr.	NO RECORDS			
May	112	18	34	2120	May	NO RECORDS			
June	86	33	46	2780	June	206	18	42	2540
July	168	40	62	3874	July	73	18	23	1436
Aug.	115	38	54	3322	Aug.	208	18	57	3558
Sept.	118	30	41	2480	Sept.	131	29	53	3168
Oct.	91	24	31	1930	Oct.	113	27	38	2358
Nov.	51	17	23	1380	Nov.	185	20	32	1948
Dec.	NO RECORDS				Dec.	96	30	46	2840
Total	..	..	..	..	Total	..	..	..	..

MANNING RIVER AT TOMALLA

Year 1962				Year 1963					
Month	Discharge in Cusecs			Discharge For Month: Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	459	48	112	6952	Jan.	438	31	86	5318
Feb.	122	30	45	2508	Feb.	130	22	36	2032
Mar.	91	26	35	2150	Mar.	393	25	117	7282
Apr.	950	26	136	8186	Apr.	373	37	84	5056
May	308	29	68	4324	May	1265	60	204	12632
June	125	27	41	2442	June	320	51	78	4696
July	360	23	55	3398	July	141	60	87	5430
Aug.	168	30	60	3714	Aug.	285	35	56	3482
Sept.	77	24	35	2130	Sept.	475	33	92	5530
Oct.	208	17	28	1715	Oct.	132	33	63	3906
Nov.	36	14	22	1322	Nov.	116	25	34	2058
Dec.	240	11	50	3134	Dec.	290	23	53	3314
Total	..	..	..	41975	Total	..	..	..	60736

Year 1964				Year 1965					
Jan.	158	20	28	1768	Jan.	8	5	5	322
Feb.	37	15	18	1064	Feb.	247	2	9	520
Mar.	77	11	21	1316	Mar.	53	0.2	4	246
Apr.	409	13	52	3108	Apr.	25	3	5	336
May.	63	22	31	1950	May	23	3	4	282
June	134	20	37	2200	June	46	4	9	546
July	225	27	47	2896	July	585	7	51	3160
Aug.	631	22	48	2984	Aug.	56	16	24	1494
Sept.	81	27	36	2210	Sept.	44	13	22	1298
Oct.	123	22	34	2102	Oct.	18	7	10	630
Nov.	33	11	17	1036	Nov.	NO RECORDS			600*
Dec.	15	6	7	450	Dec.	NO RECORDS			1000*
Total	..	..	..	23084	Total	..	..	..	10434*

* Estimated

MANNING RIVER AT TOMALLA

Year 1966

Year 1967

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	42	3	6	374	Jan.	232	12	26	1,630
Feb.	20	3	5	298	Feb.	54	11	15	844
Mar.	33	2	5	326	Mar.	307	15	80	4,976
Apr.	11	2	4	234	Apr.	297	29	90	5,406
May	18	3	5	322	May	105	18	26	1,626
June	47	7	12	744	June	681	17	198	11,878
July	12	6	7	452	July	154	32	60	3,702
Aug.	57	5	10	592	Aug.	461	30	59	3,650
Sept.	42	10	14	818	Sept.	335	25	51	3,109
Oct.	102	13	24	1,482	Oct.	681	21	78	4,810
Nov.	369	19	40	2,410	Nov.	70	14	34	2,014
Dec.	86	11	18	1,100	Dec.	36	8	13	781
Total	..	..	..	9,152	Total	..	..	..	44,426

NOWENDOC RIVER AT NOWENDOC

LOCATION: Latitude 31°31' Longitude 151°43'.

PERIOD OF ESTABLISHMENT: July 1946 to date.

COMPLETE YEARS OF COMPUTED RECORDS: 21.

ZERO OF GAUGE: R.L. 83.32 Assumed Datum.

CATCHMENT AREA: 84 Square Miles.

CONTROL: Rock.

EQUIPMENT: Staff Gauge, Range 0-20 feet.

CURRENT METER OBSERVATIONS:

- (a) Number obtained 113
- (b) Maximum observation
in cusecs : 4660
- (c) Minimum observation
in cusecs 3.6

MAXIMUM ESTIMATED DISCHARGE DURING PERIOD OF RECORDS: 11,300 cusecs.

MEAN DAILY DISCHARGE FOR 21 YEARS: 99 cusecs.

MEAN ANNUAL DISCHARGE FOR 21 YEARS: 72,300 acre feet.

NOWENDOC RIVER AT NOWENDOC

Year 1946				Year 1947					
Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	..	..	..	..	Jan.	104	1	7	446
Feb.	..	..	..	..	Feb.	840	2	128	7160
Mar.	..	..	..	..	Mar.	690	26	115	7158
Apr.	..	..	..	..	Apr.	215	26	66	3936
May	..	..	..	..	May	61	26	38	2380
June	..	..	..	..	June	52	20	33	1962
July	..	..	..	..	July	26	15	19	1192
Aug.	7	7	7	434	Aug.	20	10	15	945
Sept.	20	4	8	476	Sept.	61	15	27	1608
Oct.	10.5	3	5	283	Oct.	38	15	18	1142
Nov.	61	2	6	328	Nov.	32	9	16	965
Dec.	145	2	9	546	Dec.	2300	38	331	20496
Total	..	..	..		Total	..	..	..	49390

Year 1948				Year 1949					
Jan.	590	45	127	7902	Jan.	178	10	24	1490
Feb.	61	18	34	1968	Feb.	740	10	104	5844
Mar.	253	26	46	2836	Mar.	590	52	164	10150
Apr.	38	20	26	1572	Apr.	390	45	100	6180
May	390	20	55	3402	May	253	41	64	3984
June	1530	20	273	16370	June	570	38	96	5742
July	123	38	61	3790	July	4700	32	271	16804
Aug.	291	26	56	3486	Aug.	2550	15	306	18964
Sept.	765	32	118	7066	Sept.	840	130	350	20986
Oct.	93	26	47	2894	Oct.	480	61	143	8872
Nov.	45	15	24	1442	Nov.	390	45	107	6446
Dec.	26	10	16	1006	Dec.	272	17	49	3030
Total	..	..	..	53734	Total	..	..	..	108492

NOWENDOC RIVER AT NOWENDOC

Year 1950

Year 1951

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	145	15	29	1828	Jan.	1200	71	377	23366
Feb.	500	20	134	7526	Feb.	590	145	289	16180
Mar.	61	32	42	2614	Mar.	410	52	143	8850
Apr.	1230	32	248	14906	Apr.	93	52	71	4254
May.	160	61	83	5158	May	66	48	54	3320
June	7000	48	1182	70926	June	4000	45	276	16536
July	1710	253	666	41306	July	272	71	132	8186
Aug.	1170	145	384	23826	Aug.	480	52	98	6072
Sept.	262	82	151	9050	Sept.	52	32	41	2486
Oct.	390	82	205	12716	Oct.	38	20	27	1690
Nov.	1320	71	381	22878	Nov.	20	15	17	994
Dec.	310	45	123	7608	Dec.	20	10	14	838
Total	..	..	..	220342	Total	..	..	..	92772

Year 1952

Year 1953

Jan.	11	4	8	485	Jan.	61	15	28	1742
Feb.	178	1	37	2118	Feb.	1080	15	207	11618
Mar.	178	15	48	2990	Mar.	370	38	92	5680
Apr.	93	15	25	1478	Apr.	52	32	40	2416
May.	93	15	34	2100	May	272	41	95	5900
June	272	32	92	5536	June	45	20	30	1800
July	145	32	47	2908	July	45	20	30	1844
Aug.	4000	71	514	31850	Aug.	178	20	42	2594
Sept.	130	38	63	3754	Sept.	93	20	31	1868
Oct.	234	38	73	4526	Oct.	32	15	18	1111
Nov.	38	20	25	1524	Nov.	12	7	9	571
Dec.	93	15	23	1398	Dec.	9	5	6	386
Total	..	..	..	60667	Total	..	..	..	37530

NOWENDOC RIVER AT NOWENDOC

Year 1954

Year 1955

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	93	6	14	850	Jan.	178	9	35	2201
Feb.	3300	7	162	9058	Feb.	3640	20	476	26682
Mar.	116	15	38	2378	Mar.	1080	160	446	27354
Apr.	32	15	17	1006	Apr.	390	116	224	13414
May	32	15	19	1197	May	215	93	137	8502
June	52	15	20	1179	June	93	71	81	4876
July	291	15	50	3124	July	145	45	67	4148
Aug.	93	20	38	2370	Aug.	45	32	38	2326
Sept.	740	20	106	6370	Sept.	61	32	33	1998
Oct.	1350	38	204	12674	Oct.	410	32	80	4972
Nov.	545	32	126	7536	Nov.	178	26	48	2854
Dec.	61	26	37	2308	Dec.	410	20	92	5698
Total	..	..	..	50050	Total	..	..	..	105025

Year 1956

Year 1957

Jan.	196	17	48	3000	Jan.	56	16	25	1578
Feb.	11300	82	1219	70692	Feb.	649	16	134	7532
Mar.	2630	170	518	32114	Mar.	97	27	58	3612
Apr.	282	97	158	9502	Apr.	65	27	34	2060
May	803	86	161	9976	May	34	16	20	1238
June	450	56	102	6148	June	27	16	17	1044
July	157	21	85	5288	July	41	16	20	1210
Aug.	237	48	102	6314	Aug.	282	16	40	2500
Sept.	65	41	49	2944	Sept.	48	16	22	1338
Oct.	75	41	50	3108	Oct.	21	7	9	566
Nov.	41	16	24	1460	Nov.	16	4	7	424
Dec.	56	16	30	1860	Dec.	27	4	5	315
Total	..	..	..	152406	Total	..	..	..	23417

NOWENDOC RIVER AT NOWENDOC

Year 1958

Year 1959

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	86	5	11	706	Jan.	803	16	150	9306
Feb.	144	8	33	1852	Feb.	964	41	171	9568
Mar.	75	5	20	1244	Mar.	699	27	137	8486
Apr.	16	4	10	627	Apr.	499	8	123	7378
May	11	8	9	539	May	56	41	44	2740
June	266	8	54	3271	June	223	27	45	2704
July	48	16	24	1466	July	320	34	73	4530
Aug.	97	8	33	2064	Aug.	223	41	79	4922
Sept.	56	16	25	1510	Sept.	196	41	96	5734
Oct.	86	16	32	1968	Oct.	474	16	103	6398
Nov.	16	5	11	653	Nov.	4700	48	366	21976
Dec.	65	4	18	1102	Dec.	145	34	64	3948
Total	..	..	..	17002	Total	..	..	..	87690

Year 1960

Year 1961

Jan.	315	18	58	3566	Jan.	97	18	34	2106
Feb.	236	39	66	3846	Feb.	349	18	57	3170
Mar.	405	53	127	7902	Mar.	69	23	34	2110
Apr.	425	34	92	5496	Apr.	49	16	25	1484
May	133	26	43	2638	May	26	12	16	990
June	195	43	84	5048	June	457	16	61	3680
July	222	63	114	7066	July	69	16	21	1330
Aug.	208	34	63	3858	Aug.	160	16	40	2462
Sept.	133	26	44	2622	Sept.	136	23	56	3354
Oct.	85	13	35	2198	Oct.	136	23	38	2344
Nov.	43	13	20	1180	Nov.	160	11	44	2642
Dec.	169	18	42	2602	Dec.	125	30	56	3482
Total	..	..	..	48022	Total	..	..	..	29154

NOWENDOC RIVER AT NOWENDOC

Year 1962

Year 1963

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	1450	97	309	19152	Jan.	2670	24	238	14778
Feb.	405	63	133	7458	Feb.	250	40	70	3912
Mar.	133	48	79	4922	Mar.	470	31	134	8324
Apr.	3300	63	516	30940	Apr.	1085	70	173	10392
May	1085	74	185	11484	May	4000	153	732	45400
June	97	53	67	4042	June	166	90	134	8044
July	1145	43	163	10088	July	166	70	100	6178
Aug.	121	53	71	4408	Aug.	298	60	86	5348
Sept.	97	18	44	2612	Sept.	1355	40	143	8594
Oct.	121	18	36	2254	Oct.	349	80	127	7878
Nov.	63	15	27	1614	Nov.	250	60	95	5698
Dec.	530	9	72	4444	Dec.	332	40	112	6934
Total	..	..	..	103418	Total	..	..	..	131480

Year 1964

Year 1965

Jan.	745	27	88	5478	Jan.	102	3	15	920
Feb.	60	24	35	2056	Feb.	91	4	13	756
Mar.	510	31	77	4770	Mar.	59	4	9	554
Apr.	140	31	44	2658	Apr.	31	3	9	528
May	70	31	41	2514	May	6	4	5	284
June	332	31	78	4652	June	25	3	5	326
July	235	31	73	4510	July	745	4	55	3390
Aug.	80	31	34	2120	Aug.	23	13	15	932
Sept.	59	25	27	1630	Sept.	23	7	14	850
Oct.	80	20	33	2020	Oct.	28	6	9	542
Nov.	349	10	32	1930	Nov.	6	3	5	274
Dec.	31	6	13	808	Dec.	250	6	33	2040
Total	..	..	..	35146	Total	..	..	..	11396

NOWENDOC RIVER AT NOWENDOC

Year 1966

Year 1967

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	18	4	6	402	Jan.	102	4.0	22	1393
Feb.	33	2	9	486	Feb.	45	10.5	15.6	876
Mar.	28	4	7	408	Mar.	2300	10.5	186	11,600
Apr.	13	2	5	326	Apr.	282	38	117	7,000
May	9	4	6	356	May	208	32	74	4,600
June	23	4	7	406	June	1450	45	429	25,700
July	9	4	6	368	July	470	75	140	8,680
Aug.	20	4	7	458	Aug.	510	49	106	6,540
Sept.	20	4	7	446	Sept.	695	39	95	5,700
Oct.	38	4	9	564	Oct.	2300	13	245	15,200
Nov.	160	10	40	2400	Nov.	153	25	76	4,550
Dec.	80	4	13	786	Dec.	No Records			1,800*
Total				7406	Total	..	..	..	93,630*

* Estimated

NOWENDOC RIVER AT ROCK'S CROSSING

LOCATION: Latitude 31°46', Longitude 152°04'.

PERIOD OF ESTABLISHMENT: June 1945 to date.

COMPLETE YEARS OF COMPUTED RECORDS: 22.

ZERO OF GAUGE: R.L. 67.01 Assumed Datum.

CATCHMENT AREA: 720 Square Miles.

CONTROL: Gravel.

EQUIPMENT: Staff gauge, range 0-30 feet.

CURRENT METER OBSERVATIONS:

- (a) Number obtained : 106
- (b) Maximum observation
in cusecs : 1040
- (c) Minimum observation
in cusecs : 8

MAXIMUM ESTIMATED DISCHARGE DURING PERIOD OF RECORDS: 78,000 cusecs.

MEAN DAILY DISCHARGE FOR 22 YEARS: 779 cusecs.

MEAN ANNUAL DISCHARGE FOR 22 YEARS: 569,000 acre feet.

NOWENDOC RIVER AT ROCK'S CROSSING

Year 1945

Year 1946

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.					Jan.	43	6	21	1290
Feb.					Feb.	490	6	77	4292
Mar.					Mar.	54400	24	1663	103102
Apr.					Apr.	12300	116	1345	80710
May					May	374	116	196	12180
June					June	239	80	95	5700
July	25400	116	1442	89400	July	80	43	29	1818
Aug.	271	97	172	10664	Aug.	43	24	30	1886
Sept.	116	53	81	4844	Sept.	59	21	31	1868
Oct.	97	28	25	1554	Oct.	28	6	17	1084
Nov.	614	21	70	4218	Nov.	48	4	11	672
Dec.	2500	21	237	14690	Dec.	116	6	28	1712
Total	..	..	..		Total	..	..	..	216314

Year 1947

Year 1948

Jan.	59	44	111	696	Jan.	2440	184	605	37498
Feb.	8670	15	1293	72434	Feb.	184	97	127	7340
Mar.	3050	210	799	49548	Mar.	1140	88	301	18084
Apr.	2960	160	827	49624	Apr.	356	97	146	8748
May	338	172	239	14836	May	2440	116	302	18712
June	800	116	233	14004	June	20800	97	1987	119194
July	116	97	100	6200	July	950	80	318	19738
Aug.	116	65	84	5206	Aug.	490	160	276	17086
Sept.	239	35	95	5676	Sept.	1190	21	371	22266
Oct.	80	35	51	3166	Oct.	NO RECORDS			17000*
Nov.	35	11	22	1350	Nov.	NO RECORDS			7400*
Dec.	8480	160	1170	72530	Dec.	210	35	108	6680
Total	..	..	..	295270	Total	..	..	..	299746*

* Estimated

NOWENDOC RIVER AT ROCK'S CROSSING

Year 1949

Year 1950

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	490	53	154	9572	Jan.	655	73	232	14354
Feb.	23300	53	767	42940	Feb.	4000	200	934	52280
Mar.	6200	271	1044	64714	Mar.	206	37	90	5556
Apr.	6200	184	860	51628	Apr.	5530	37	644	38618
May	490	184	272	16314	May	376	376	376	23312
June	4400	160	462	27706	June	49300	140	9548	572862
July	38800	137	1737	107700	July	14200	1740	4902	303920
Aug.	39700	210	3327	206294	Aug.	23400	725	2847	176530
Sept.	3800	945	1133	67980	Sept.	NO RECORDS			48500*
Oct.	821	97	213	13232	Oct.	NO RECORDS			69000*
Nov.	956	97	296	17734	Nov.	NO RECORDS			124000*
Dec.	615	85	238	14740	Dec.	1069	392	659	40846
Total				640554	Total				1469778*

Year 1951

Year 1952

Jan.	27200	465	4903	303860	Jan.	60	35	49	3048
Feb.	4900	685	1352	75700	Feb.	4400	35	422	24448
Mar.	14700	465	1817	112710	Mar.	5000	140	877	54378
Apr.	1218	299	464	27838	Apr.	277	140	199	11936
May	270	216	241	14926	May	247	107	152	9432
June	12700	222	1690	101428	June	432	122	212	12700
July	1069	360	546	33840	July	500	107	160	9898
Aug.	765	234	321	19930	Aug.	31500	247	3617	224276
Sept.	234	160	184	11062	Sept.	465	185	301	18078
Oct.	160	114	137	8464	Oct.	183	91	137	8520
Nov.	115	82	91	5464	Nov.	88	60	73	4398
Dec.	82	51	60	3718	Dec.	94	35	54	3370
Total				718940	Total				384482

* Estimated

NOWENDOC RIVER AT ROCK'S CROSSING

Year 1953

Year 1954

Month	Discharge In Cusecs			Discharge for Month Acre Feet	Month	Discharge In Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	337	65	143	8848	Jan.	149	9	61	3782
Feb.	14300	60	1810	100856	Feb.	44500	4	1557	87184
Mar.	3550	213	899	55726	Mar.	387	98	217	13458
Apr.	680	189	374	22426	Apr.	293	84	108	6464
May	3630	149	720	44662	May	213	71	118	7294
June	264	131	183	11000	June	323	71	126	7574
July	179	114	147	9140	July	1560	59	295	18272
Aug.	106	98	99	6124	Aug.	323	59	156	9726
Sept.	98	71	88	5270	Sept.	12000	59	1028	61658
Oct.	65	49	56	3454	Oct.	14000	401	1664	103196
Nov.	49	32	38	2296	Nov.	5200	306	1020	61000
Dec.	32	9	17	1046	Dec.	NO RECORDS			13500*
Total	..	..	..	270848	Total	..	..	..	393108*

Year 1955

Year 1956

Jan.	NO RECORDS			13300*	Jan.	2800	65	288	17836
Feb.	36100	970	5878	329180	Feb.	78000	418	6704	388854
Mar.	12700	306	2680	166148	Mar.	8090	1975	3573	221420
Apr.	10100	368	2211	132640	Apr.	1790	70	539	32362
May	8090	277	1091	67672	May	70	55	65	4050
June	368	291	315	18918	June	2580	55	293	17552
July	336	277	300	18598	July	1520	220	545	33772
Aug.	277	251	274	16992	Aug.	583	220	338	20984
Sept.	264	96	180	10786	Sept.	220	156	216	12944
Oct.	867	65	265	16432	Oct.	156	120	134	8304
Nov.	115	65	68	4060	Nov.	138	65	104	6220
Dec.	1650	65	672	41650	Dec.	543	55	258	16024
Total	..	..	..	836376	Total	..	..	..	780322

* Estimated

NOWENDOC RIVER AT ROCK'S CROSSING

Year 1957

Year 1958

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	112	50	68	4188	Jan.	855	7	102	6338
Feb.	19600	55	1371	76752	Feb.	470	46	162	9084
Mar.	1330	65	462	28642	Mar.	166	18	60	3718
Apr.	220	65	122	7308	Apr.	112	27	68	4090
May	104	76	90	5572	May	65	27	44	2722
June	120	76	90	5382	June	2580	27	360	21582
July	129	65	90	5370	July	374	70	157	9708
Aug.	583	65	140	8710	Aug.	374	65	126	7808
Sept.	268	55	99	5912	Sept.	244	65	91	5460
Oct.	50	33	38	2352	Oct.	244	33	110	6846
Nov.	176	14	61	3666	Nov.	176	22	35	2080
Dec.	46	7	22	1366	Dec.	470	22	299	18540
Total	..	..	..	155220	Total	..	..	..	97976

Year 1959

Year 1960

Jan.	9300	65	1382	85666	Jan.	16900	11	1370	84934
Feb.	14100	220	1292	72338	Feb.	1650	234	750	43492
Mar.	7700	248	992	61522	Mar.	6200	460	1715	106350
Apr.	1165	272	569	34128	Apr.	440	126	198	11900
May	272	74	165	10200	May	850	126	220	13626
June	1720	7	190	11372	June	700	206	342	20538
July	955	272	432	26766	July	422	206	282	17472
Aug.	3300	35	413	25592	Aug.	422	126	235	14552
Sept.	1110	206	462	27694	Sept.	520	111	146	8780
Oct.	3300	206	878	54428	Oct.	500	86	123	7628
Nov.	36500	98	4262	255708	Nov.	126	71	93	5602
Dec.	560	160	389	24144	Dec.	265	76	143	8894
Total	..	..	..	689558	Total	..	..	..	343768

NOWENDOC RIVER AT ROCK'S CROSSING

Year 1961					Year 1962				
Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	700	76	296	18334	Jan.	21400	560	4877	302370
Feb.	1650	88	538	30112	Feb.	NO RECORDS			40000*
Mar.	700	40	260	16100	Mar.	NO RECORDS			27000*
Apr.	160	47	91	5454	Apr.	40700	160	6023	361378
May	130	65	84	5226	May	24100	650	10800	667000
June	3300	140	671	40246	June	3800	257	1350	81000
July	206	120	144	8958	July	22000	271	3114	193000
Aug.	282	88	142	8830	Aug.	1165	285	557	34500
Sept.	335	60	184	11026	Sept.	850	146	338	20300
Oct.	1005	102	279	17320	Oct.	560	102	226	14000
Nov.	560	140	273	16410	Nov.	440	91	208	12500
Dec.	NO RECORDS			20000*	Dec.	12200	102	1712	106000
Total	..	..	..	198016*	Total	..	..	..	1859048*

Year 1963					Year 1964				
Jan.	23200	480	4314	267000	Jan.	2960	248	521	32300
Feb.	1520	345	854	47800	Feb.	640	248	374	21700
Mar.	24400	330	4076	252700	Mar.	8610	248	1084	67200
Apr.	36000	440	3509	210500	Apr.	454	224	334	20100
May	41600	1137	7425	460300	May	348	224	295	18300
June	1247	464	767	46000	June	1165	160	353	21200
July	1005	560	730	45250	July	306	240	261	16200
Aug.	1005	376	701	43500	Aug.	855	144	365	22700
Sept.	12200	140	1466	88000	Sept.	404	220	265	15880
Oct.	2080	494	821	50900	Oct.	328	60	141	8740
Nov.	955	248	522	31300	Nov.	855	97	397	23800
Dec.	1720	320	786	48800	Dec.	144	60	96	5950
Total	..	..	..	1592050	Total	..	..	..	274070

* Estimated

NOWENDOC RIVER AT ROCK'S CROSSING

Year 1965					Year 1966				
Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	720	60	151	9340	Jan.	25	5	14	862
Feb.	494	71	182	10200	Feb.	494	14	90	5050
Mar.	509	97	222	13800	Mar.	390	25	105	6490
Apr.	162	71	108	6450	Apr.	55	16	29	1720
May	284	32	60	3740	May	55	19	35	2140
June	404	97	191	11500	June	144	25	40	2420
July	9020	6	885	54900	July	32	6	24	1490
Aug.	112	60	83	5130	Aug.	50	6	24	1480
Sept.	97	32	55	3330	Sept.	60	16	30	1770
Oct.	60	25	34	2110	Oct.	144	22	42	2620
Nov.	60	6	17	1016	Nov.	855	28	106	6330
Dec.	1450	2	296	18300	Dec.	64	16	38	2340
Total				139816	Total				34712

Year 1967

Jan.	464	36	114	7060
Feb.	1165	64	232	13000
Mar.	16630	111	1560	96600
Apr.	5000	172	1305	78300
May	1000	119	381	23600
June	20200	192	4880	293000
July	4300	400	1031	63900
Aug.	10140	270	1258	78000
Sept.	15540	205	1780	107000
Oct.	40200	153	3593	223000
Nov.	1000	192	517	31000
Dec.	270	88	151	9360
Total				823120

GLOUCESTER RIVER AT FORBESDALE.

LOCATION: Latitude 32°04' Longitude 151°54'

PERIOD OF ESTABLISHMENT: June 1948 to date.

COMPLETE YEARS OF COMPUTED RECORDS: 19

ZERO OF GAUGE: R.L. 406.53 N.W.W.C. Datum

CATCHMENT AREA: 80 square miles.

CONTROL: Concrete causeway.

EQUIPMENT: Automatic recorder (Pressure Type)
installed June 1954
Staff gauge, range 0-15 feet.

CURRENT METER OBSERVATIONS:

- (a) Number obtained : 116
- (b) Maximum observation
in cusecs : 873
- (c) Minimum observation
in cusecs : 0

MAXIMUM ESTIMATED DISCHARGE DURING PERIOD OF RECORDS: 20,500 cusecs.

MEAN DAILY DISCHARGE FOR 19 YEARS: 122 cusecs.

MEAN ANNUAL DISCHARGE FOR 19 YEARS: 89,200 acre feet.

GLOUCESTER RIVER AT FORBEDALE

Year 1948

Year 1949

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	..	..	..	..	Jan.	225	10	38	2,374
Feb.	..	..	..	..	Feb.	520	26	103	5,752
Mar.	..	..	..	..	Mar.	370	65	185	11,440
Apr.	..	..	..	..	Apr.	225	19	60	3,572
May	..	..	..	..	May	19	19	19	1,178
June	597	19	145	8,704	June	845	19	209	12,562
July	48	19	39	2,402	July	6000	32	538	33,338
Aug.	32	19	25	1,548	Aug.	1180	48	272	16,840
Sept.	790	19	119	7,146	Sept.	520	65	262	15,732
Oct.	65	19	35	2,148	Oct.	65	32	61	3,764
Nov.	19	10	13	760	Nov.	520	19	119	7,158
Dec.	10	10	10	620	Dec.	320	19	43	2,668
Total	..	..	..	..	Total	..	..	..	116,378

Year 1950

Year 1951

Jan.	790	19	134	8,284	Jan.	9500	65	902	55,910
Feb.	845	32	289	16,192	Feb.	735	65	121	6,800
Mar.	65	32	59	3,664	Mar.	370	65	78	4,810
Apr.	845	65	237	14,224	Apr.	65	48	62	3,730
May	65	65	65	4,030	May	48	48	48	2,976
June	10800	65	1511	90,660	June	2000	48	377	22,620
July	1180	520	732	45,370	July	100	65	73	4,550
Aug.	1180	65	437	27,070	Aug.	48	19	21	1,296
Sept.	65	65	65	3,900	Sept.	19	10	16	978
Oct.	65	65	65	4,030	Oct.	10	10	10	620
Nov.	1420	65	346	20,740	Nov.	10	0	5	286
Dec.	225	65	91	5,660	Dec.	0	0	0	0
Total	..	..	..	243,824	Total	..	..	..	104,576

GLOUCESTER RIVER AT FORBESDALE

Year 1952

Year 1953

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	0	0	0	0	Jan.	259	3	28	1,754
Feb.	382	0	36	2,114	Feb.	765	20	189	10,860
Mar.	382	35	118	7,292	Mar.	382	20	115	7,112
Apr.	55	20	35	2,070	Apr.	35	20	24	1,410
May	224	9	55	3,382	May	1300	0	94	5,846
June	480	9	57	3,394	June	0	0	0	0
July	157	20	27	1,654	July	61	0	9	538
Aug.	5490	55	749	46,454	Aug.	0	0	0	0
Sept.	55	20	22	1,300	Sept.	9	0	0.6	38
Oct.	20	20	20	1,240	Oct.	0	0	0	0
Nov.	20	20	20	1,200	Nov.	5	0	4	240
Dec.	20	3	10	594	Dec.	5	0	2.5	160
Total	..	..	..	70,694	Total	..	..	..	27,958

Year 1954

Year 1955

Jan.	535	0	31	1,930	Jan.	2670	14	94	5,808
Feb.	2000	5	393	22,008	Feb.	18200	27	1010	56,600
Mar.	480	14	136	8,420	Mar.	1650	93	388	24,058
Apr.	14	5	12	714	Apr.	1100	48	199	11,932
May	5	5	5	310	May	1230	48	268	16,590
June	232	5	29	1,764	June	70	48	55	3,276
July	200	10	46	2,822	July	93	14	36	2,228
Aug.	105	5	39	2,428	Aug.	14	14	14	868
Sept.	1030	5	106	6,356	Sept.	27	12	15	914
Oct.	2000	37	218	13,528	Oct.	21	5	14	888
Nov.	3260	27	120	7,338	Nov.	14	5	10	624
Dec.	93	21	61	3,776	Dec.	1430	14	70	4,318
Total	..	..	..	71,394	Total	..	..	..	128,104

GLOUCESTER RIVER AT FORBESDALE

Year 1956					Year 1957				
Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	895	16	73	4,550	Jan.	16	4	5	296
Feb.	6720	143	672	38,966	Feb.	8280	4	447	25,012
Mar.	20500	200	789	48,920	Mar.	10800	48	314	19,444
Apr.	1500	16	129	7,732	Apr.	48	16	30	1,758
May	8880	48	211	13,102	May	16	4	10	596
June	2090	48	137	8,228	June	48	4	10	584
July	117	30	54	3,356	July	69	13	25	1,576
Aug.	170	30	51	3,150	Aug.	270	10	53	3,292
Sept.	30	16	23	1,394	Sept.	830	16	38	2,262
Oct.	30	16	19	1,188	Oct.	10	4	7	404
Nov.	16	4	10	576	Nov.	4	0	2	120
Dec.	10	4	7	410	Dec.	0	0	0	0
Total	..	..	..	131,572	Total	..	..	..	55,374

Year 1958					Year 1959				
Jan.	590	0	16	1,006	Jan.	1820	16	139	8,642
Feb.	370	16	42	2,370	Feb.	5320	48	276	15,434
Mar.	30	16	22	1,356	Mar.	4070	48	262	16,234
Apr.	200	16	34	2,046	Apr.	535	69	146	8,808
May	30	16	21	1,328	May	69	30	56	3,476
June	92	23	48	2,878	June	48	16	22	1,304
July	480	23	74	4,608	July	320	16	73	4,496
Aug.	26	14	22	1,340	Aug.	2000	30	203	12,596
Sept.	48	13	19	1,148	Sept.	117	39	71	4,276
Oct.	30	16	18	1,132	Oct.	1100	39	220	13,648
Nov.	10	0	5	272	Nov.	1820	80	269	16,160
Dec.	170	4	42	2,620	Dec.	200	16	48	2,998
Total	..	..	..	22,104	Total	..	..	..	108,072

GLOUCESTER RIVER AT FORBESDALE

Year 1960					Year 1961				
Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	92	4	26	1,600	Jan.	1360	30	126	7,818
Feb.	1160	16	78	4,552	Feb.	320	30	67	3,732
Mar.	232	48	124	7,738	Mar.	92	16	40	2,482
Apr.	170	30	55	3,306	Apr.	117	16	29	1,740
May	117	23	33	2,032	May	69	16	24	1,498
June	590	30	79	4,712	June	1820	21	212	12,734
July	143	39	69	4,304	July	61	21	33	2,076
Aug.	1360	16	40	2,466	Aug.	230	14	51	3,138
Sept.	30	10	17	1,002	Sept.	113	21	48	2,908
Oct.	30	10	15	950	Oct.	490	14	58	3,612
Nov.	30	4	12	708	Nov.	590	21	81	4,848
Dec.	1570	4	147	9,130	Dec.	1500	61	262	16,232
Total	..	..	..	42,500	Total	..	..	..	62,818

Year 1962					Year 1963				
Jan.	830	61	303	18,776	Jan.	2560	39	223	13,804
Feb.	700	39	128	7,140	Feb.	445	21	128	7,146
Mar.	126	39	73	4,554	Mar.	10400	84	698	43,264
Apr.	3420	39	494	29,618	Apr.	3260	97	427	25,600
May	2000	39	209	12,982	May	10800	97	706	43,800
June	87	21	44	2,660	June	450	58	114	6,850
July	196	21	48	2,962	July	162	58	105	6,500
Aug.	113	21	37	2,282	Aug.	700	34	76	4,690
Sept.	168	8	48	2,880	Sept.	970	25	221	13,300
Oct.	140	21	33	2,064	Oct.	700	58	125	7,740
Nov.	39	8	19	1,134	Nov.	162	16	57	3,402
Dec.	7880	8	281	17,444	Dec.	2670	5	258	15,992
Total	..	..	..	104,496	Total	..	..	..	192,088

GLOUCESTER RIVER AT FORBESDALE

Year 1964

Year 1965

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	84	16	40	2,452	Jan.	15	0	5	289
Feb.	84	5	22	1,300	Feb.	136	4	12	690
Mar.	550	16	88	5,486	Mar.	4	0	2	97
Apr.	2670	5	165	9,874	Apr.	12	0	6	350
May	110	16	48	2,980	May	9	4	7	449
June	1360	16	106	6,346	June	36	3	6	348
July	34	16	22	1,370	July	750	6	61	3,770
Aug.	58	5	14	870	Aug.	28	4	13	816
Sept.	11	5	7	388	Sept.	14	7	10	592
Oct.	34	4	7	416	Oct.	13	4	6	390
Nov.	5	1	3	156	Nov.	7	0.3	3	156
Dec.	4	0	1	89	Dec.	750	18	87	5,420
Total	..	..	..	31,727	Total	..	..	..	13,367

Year 1966

Year 1967

Jan.	36	1	14	890	Jan.	450	14	44	2,700
Feb.	800	4	75	4,220	Feb.	350	32	83	4,660
Mar.	82	32	51	3,160	Mar.	3420	82	293	18,200
Apr.	190	14	32	1,940	Apr.	1100	55	228	13,700
May	55	23	32	1,990	May	550	55	131	8,140
June	32	14	24	1,450	June	1730	55	566	34,000
July	14	9	12	758	July	450	55	123	7,600
Aug.	55	4	12	736	Aug.	4840	55	181	11,200
Sept.	23	14	18	1,056	Sept.	1840	32	165	9,930
Oct.	82	23	38	2,356	Oct.	8880	23	383	23,700
Nov.	970	23	82	4,890	Nov.	136	32	74	4,420
Dec.	43	23	31	1,896	Dec.	110	4	56	3,440
Total	..	..	..	25,342	Total	..	..	..	141,690

BARRINGTON RIVER AT BOB'S CROSSING

<u>LOCATION:</u>	Latitude 32°02' Longitude 151°28'
<u>PERIOD OF ESTABLISHMENT:</u>	January 1944 to date
<u>COMPLETE YEARS OF COMPUTED RECORDS:</u>	15
<u>ZERO OF GAUGE:</u>	R.L. 4596.96 W.C. & I.C. Datum
<u>CATCHMENT AREA:</u>	8 square miles
<u>CONTROL:</u>	Rock
<u>EQUIPMENT:</u>	Automatic Recorder (Float type) Installed January 1954. Staff gauge, Range 0 to 15 feet.
<u>CURRENT METER OBSERVATIONS:</u>	(a) Number obtained : .106 (b) Maximum observation in cusecs : 205 (c) Minimum observation in cusecs : 0.9
<u>MAXIMUM ESTIMATED DISCHARGE DURING PERIOD OF RECORDS:</u>	1,690 cusecs
<u>MEAN DAILY DISCHARGE FOR 15 YEARS:</u>	36 cusecs
<u>MEAN ANNUAL DISCHARGE FOR 15 YEARS:</u>	26,600 acre feet

BARRINGTON RIVER AT BOB'S CROSSING

Year 1944

Year 1945

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	No Records			..	Jan.	21	1	4	223
Feb.	57	18	31	1,814	Feb.	17	1	4	215
Mar.	25	7	13	778	Mar.	21	1	3	212
Apr.	34	5	10	628	Apr.	25	5	9	559
May	175	5	23	1,456	May	140	4	21	1,317
June	39	12	18	1,096	June	1015	10	137	8,204
July	205	15	54	3,338	July	347	21	56	3,454
Aug.	212	27	76	4,700	Aug.	50	15	26	1,606
Sept.	61	18	32	1,936	Sept.	21	7	12	736
Oct.	21	7	13	808	Oct.	50	6	12	776
Nov.	25	1	5	324	Nov.	89	5	17	1,054
Dec.	15	2	4	264	Dec.	50	5	10	608
Total	..	..	..	..	Total	..	..	..	18,964

Year 1946

Year 1947

Jan.	12	3	5	322	Jan.	7	0	1.8	112
Feb.	57	1	6	366	Feb.	438	1	46	2,559
Mar.	119	6	14	878	Mar.	119	15	34	2,114
Apr.	1090	12	101	6,050	Apr.	140	15	52	3,148
May	119	15	27	1,700	May	81	12	25	1,550
June	239	21	52	3,136	June	15	15	15	900
July	44	15	24	1,476	July	21	9	14	844
Aug.	15	6	9	576	Aug.	29	7	11	708
Sept.	18	4	7	450	Sept.	81	11	22	1,342
Oct.	7	2	4	262	Oct.	119	12	34	2,132
Nov.	5	1	2	143	Nov.	34	15	22	1,296
Dec.	15	0.5	3	169	Dec.	187	25	76	4,740
Total	..	..	..	15,528	Total	..	..	..	21,445

BARRINGTON RIVER AT BOB'S CROSSING

Year 1948

Year 1949

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	129	12	34	2,080	Jan.	No Records			..
Feb.	29	8	14	804	Feb.	No Records			..
Mar.	No Records			..	Mar.	No Records			..
Apr.	No Records			..	Apr.	No Records			..
May	No Records			..	May	38	11	23	1,404
June	No Records			..	June	No Records			..
July	No Records			..	July	No Records			..
Aug.	No Records			..	Aug.	No Records			..
Sept.	No Records			..	Sept.	No Records			..
Oct.	No Records			..	Oct.	No Records			..
Nov.	No Records			..	Nov.	No Records			..
Dec.	No Records			..	Dec.	No Records			..
Total	..	..	..	..	Total	..	..	..	..

Year 1950

Year 1951

Jan.	112	5	18	1,090	Jan.	No Records			..
Feb.	94	10	38	2,142	Feb.	No Records			..
Mar.	No Records			..	Mar.	No Records			..
Apr.	No Records			..	Apr.	No Records			..
May	No Records			..	May	No Records			..
June	No Records			..	June	No Records			..
July	No Records			..	July	No Records			..
Aug.	No Records			..	Aug.	No Records			..
Sept.	No Records			..	Sept.	No Records			..
Oct.	174	14	56	3,408	Oct.	No Records			..
Nov.	214	22	64	3,754	Nov.	No Records			..
Dec.	50	11	25	1,550	Dec.	No Records			..
Total	..	..	..	..	Total	..	..	..	..

BARRINGTON RIVER AT BOB'S CROSSING

Year 1952

Year 1953

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	No Records			..	Jan.	No Records			..
Feb.	No Records			..	Feb.	No Records			..
Mar.	No Records			..	Mar.	No Records			..
Apr.	No Records			..	Apr.	No Records			..
May	No Records			..	May	No Records			..
June	No Records			..	June	No Records			..
July	No Records			..	July	No Records			..
Aug.	No Records			..	Aug.	No Records			..
Sept.	No Records			..	Sept.	No Records			..
Oct.	No Records			..	Oct.	No Records			..
Nov.	44	5	12	742	Nov.	No Records			..
Dec.	54	2	14	870	Dec.	No Records			..
Total	..	..	..	..	Total	..	..	..	..

Year 1954

Year 1955

Jan.	No Records			..	Jan.	91	9	26	1,632
Feb.	820	8	74	4,134	Feb.	880	20	118	6,635
Mar.	91	11	24	1,506	Mar.	362	29	84	5,216
Apr.	17	8	10	620	Apr.	225	25	53	3,174
May	38	6	13	796	May	164	20	47	2,918
June	212	12	38	2,266	June	No Records			..
July	162	11	42	2,628	July	No Records			..
Aug.	106	17	41	2,558	Aug.	77	20	28	1,750
Sept.	455	14	70	4,200	Sept.	72	13	21	1,238
Oct.	347	24	63	2,922	Oct.	144	9	28	1,718
Nov.	122	14	38	2,268	Nov.	77	9	22	1,335
Dec.	122	13	21	1,206	Dec.	130	13	32	2,000
Total	..	..	..	..	Total	..	..	..	..

BARRINGTON RIVER AT BOB'S CROSSING

Year 1956

Year 1957

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	362	5	40	2,488	Jan.	42	3	10	595
Feb.	786	59	164	9,552	Feb.	1690	3	124	6,944
Mar.	513	48	100	6,211	Mar.	130	11	31	1,940
Apr.	72	14	23	1,406	Apr.	61	5	10	646
May	348	41	57	3,524	May	7	3	5	313
June	164	31	48	2,916	June	54	2	6	358
July	48	22	36	2,214	July	74	5	23	1,464
Aug.	23	16	21	1,304	Aug.	190	15	61	3,782
Sept.	15	10	13	806	Sept.	93	8	26	1,580
Oct.	22	8	17	1,056	Oct.	8	3	5	334
Nov.	17	5	10	602	Nov.	4	1	2	166
Dec.	24	3	10	614	Dec.	27	1	2	120
Total	..	..	..	32,693	Total	..	..	..	18,242

Year 1958

Year 1959

Jan.	145	25	9	542	Jan.	413	15	78	4,868
Feb.	74	5	17	984	Feb.	259	15	47	2,652
Mar.	94	5	15	938	Mar.	122	27	50	3,134
Apr.	175	5	23	1,372	Apr.	243	24	57	3,456
May	175	11	21	1,304	May	80	17	29	1,782
June	182	11	51	3,062	June	431	11	39	2,342
July	339	11	47	2,934	July	243	30	77	4,788
Aug.	37	9	16	1,018	Aug.	299	24	84	5,214
Sept.	115	11	26	1,608	Sept.	80	24	42	2,500
Oct.	130	15	35	2,192	Oct.	339	21	118	7,296
Nov.	54	6	11	664	Nov.	283	15	55	3,326
Dec.	49	6	15	928	Dec.	63	4	109	6,792
Total	..	..	..	17,546	Total	..	..	..	48,150

BARRINGTON RIVER AT BOB'S CROSSING

Year 1960

Year 1961

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	45	2	6	396	Jan.	583	21	70	4,334
Feb.	137	3	34	1,998	Feb.	161	15	37	2,068
Mar.	160	15	53	3,272	Mar.	70	13	23	1,404
Apr.	56	10	19	1,132	Apr.	140	9	22	1,349
May	68	10	26	1,594	May	52	16	25	1,574
June	235	26	70	4,218	June	760	22	101	6,048
July	175	32	59	3,678	July	51	14	19	1,208
Aug.	87	26	39	2,446	Aug.	153	15	49	3,050
Sept.	98	19	43	2,590	Sept.	175	19	66	4,072
Oct.	115	15	27	1,672	Oct.	68	12	22	1,362
Nov.	98	10	18	1,060	Nov.	176	9	25	1,490
Dec.	566	11	107	6,606	Dec.	475	25	95	5,912
Total	..	..	..	30,662	Total	..	..	..	33,871

Year 1962

Year 1963

Jan.	190	25	72	4,460	Jan.	175	15	42	2,624
Feb.	108	19	39	2,186	Feb.	148	12	37	2,081
Mar.	93	17	31	1,920	Mar.	1,024	16	103	6,405
Apr.	931	15	143	8,582	Apr.	225	20	50	2,990
May	290	20	63	3,912	May	398	23	91	5,644
June	45	14	21	1,265	June	232	23	62	3,696
July	208	12	40	2,465	July	156	38	61	3,802
Aug.	149	16	36	2,236	Aug.	164	25	46	2,838
Sept.	141	15	40	2,388	Sept.	344	15	68	4,080
Oct.	202	14	34	2,128	Oct.	86	18	46	2,842
Nov.	71	9	23	1,396	Nov.	105	15	28	1,680
Dec.	362	7	50	3,020	Dec.	257	18	51	3,152
Total	..	..	..	35,958	Total	..	..	..	41,834

BARRINGTON RIVER AT BOB'S CROSSING

Year 1964

Year 1965

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	83	8	14	915	Jan.	12	2	5	296
Feb.	30	5	9	506	Feb.	26	4	6	345
Mar.	309	8	44	2,730	Mar.	8	2	3	171
Apr.	276	10	42	2,497	Apr.	11	2	4	242
May	101	14	30	1,879	May	26	3	4	244
June	386	12	51	3,051	June	85	3	11	686
July	85	12	24	1,517	July	526	10	52	3,204
Aug.	347	10	25	1,576	Aug.	53	11	19	1,174
Sept.	46	12	20	1,176	Sept.	36	7	12	752
Oct.	82	11	21	1,276	Oct.	45	6	9	570
Nov.	60	7	16	981	Nov.	44	5	9	544
Dec.	29	4	7	426	Dec.	95	7	27	1,656
Total	..	..	..	18,530	Total	..	..	..	9,884

Year 1966

Year 1967

Jan.	23	4	12	746	Jan.	243	7	23	1,422
Feb.	384	3	34	1,892	Feb.	188	12	34	1,928
Mar.	118	10	22	1,344	Mar.	382	22	67	4,192
Apr.	68	9	18	1,108	Apr.	160	16	66	3,961
May	87	9	19	1,208	May	121	15	36	2,198
June	94	17	34	2,062	June	359	22	141	8,439
July	33	9	12	762	July	131	16	40	2,488
Aug.	94	9	22	1,358	Aug.	292	23	49	3,034
Sept.	79	22	35	2,102	Sept.	403	15	57	3,430
Oct.	166	19	34	2,125	Oct.	996	11	75	4,630
Nov.	215	12	30	1,782	Nov.	49	8	19	1,175
Dec.	40	8	17	1,046	Dec.	37	5	10	588
Total	..	..	..	17,535	Total	..	..	..	37,485

BARRINGTON RIVER AT FORBESDALE

LOCATION: Latitude 32°03' Longitude 151°52'

PERIOD OF ESTABLISHMENT: November, 1945 to date

COMPLETE YEARS OF COMPUTED RECORDS: 22

ZERO OF GAUGE: R.L. 406.13 North West Water Conservation Datum.

CATCHMENT AREA: 243 Square Miles.

CONTROL: Concrete Causeway.

EQUIPMENT: Staff Gauge, range 0-30 feet.

CURRENT METER OBSERVATIONS:

- (a) Number obtained : 112
- (b) Maximum observation
in cusecs : 6400
- (c) Minimum observation
in cusecs : 6.7

MAXIMUM ESTIMATED DISCHARGE DURING PERIOD OF RECORDS: 48,500 cusecs.

MEAN DAILY DISCHARGE FOR 22 YEARS: 436 cusecs.

MEAN ANNUAL DISCHARGE FOR 22 YEARS: 319,000 acre feet.

BARRINGTON RIVER AT FORBESDALE

Year 1945

Year 1946

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	..	..	..	..	Jan.	55	12	28	1714
Feb.	..	..	..	..	Feb.	350	6	58	3264
Mar.	..	..	..	..	Mar.	5600	45	254	15776
Apr.	..	..	..	..	Apr.	15400	102	821	49272
May	..	..	..	..	May	270	93	145	8972
June	NO	RECORDS		64000*	June	970	85	236	14188
July	NO	RECORDS		27000*	July	250	69	126	7828
Aug.	NO	RECORDS		12600*	Aug.	69	30	43	2670
Sept.	NO	RECORDS		5800*	Sept.	102	20	35	2106
Oct.	NO	RECORDS		6100*	Oct.	25	9	16	1002
Nov.	NO	RECORDS		8300*	Nov.	55	6	14	976
Dec.	230	30	72	4478	Dec.	85	9	24	1468
Total	..	..	..	..	Total	..	..	..	109236

Year 1947

Year 1948

Jan.	42	5	11	658	Jan.	630	147	286	17750
Feb.	6000	12	744	41758	Feb.	270	85	120	6970
Mar.	2090	155	474	29416	Mar.	1535	120	419	25984
Apr.	1000	138	269	16162	Apr.	370	120	191	11464
May	390	102	153	9488	May	7000	123	580	35988
June	568	93	229	13764	June	6700	94	761	45674
July	138	62	80	4936	July	370	138	212	13248
Aug.	120	42	66	4102	Aug.	330	85	136	8448
Sept.	320	69	120	7218	Sept.	2090	138	500	29976
Oct.	270	62	113	7026	Oct.	350	55	149	9244
Nov.	129	55	82	4890	Nov.	85	42	56	3344
Dec.	16600	197	1371	84992	Dec.	48	12	30	1860
Total	..	..	..	224410	Total	..	..	..	209950

* Estimated

BARRINGTON RIVER AT FORBESDALE

Year 1949					Year 1950				
Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	750	20	141	8748	Jan.	1920	42	197	12210
Feb.	2270	55	338	18926	Feb.	6850	85	930	52072
Mar.	2780	230	814	50478	Mar.	480	172	284	17622
Apr.	1760	155	375	22470	Apr.	5200	172	1133	68006
May.	290	138	192	11904	May	1760	270	424	26282
June	3420	155	519	31146	June	20000	270	4148	248860
July	10800	155	626	38834	July	6850	635	1783	110500
Aug.	5600	155	719	44570	Aug.	1460	370	742	46014
Sept.	2370	370	699	41944	Sept.	1060	250	416	24958
Oct.	480	172	269	16688	Oct.	1610	230	575	25644
Nov.	435	102	172	10284	Nov.	12400	220	1321	79290
Dec.	190	55	110	6848	Dec.	830	190	385	23854
Total	..	..	..	302840	Total	..	..	..	735312

Year 1951					Year 1952				
Jan.	13600	235	2053	127302	Jan.	42	12	27	1676
Feb.	3220	255	677	37892	Feb.	1315	12	175	10140
Mar.	1610	230	586	36318	Mar.	725	85	240	14882
Apr.	435	155	224	13446	Apr.	1185	85	275	16520
May	155	85	116	7188	May	580	120	242	15022
June	10300	88	1447	86820	June	2830	123	458	27500
July	2090	270	523	32436	July	725	138	243	15088
Aug.	580	181	252	15642	Aug.	17400	340	2663	165082
Sept.	190	120	149	8950	Sept.	350	120	168	10110
Oct.	190	69	116	7166	Oct.	530	120	218	13478
Nov.	85	30	46	2746	Nov.	190	55	101	6084
Dec.	69	25	37	2274	Dec.	120	30	49	3050
Total	..	..	..	378180	Total	..	..	..	298632

BARRINGTON RIVER AT FORBESDALE

Year 1953

Year 1954

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	785	55	250	15508	Jan.	895	30	143	8890
Feb.	4080	85	793	44390	Feb.	28100	30	1660	92800
Mar.	1760	210	441	27338	Mar.	1040	102	278	17238
Apr.	480	155	265	15900	Apr.	102	49	66	3960
May.	5300	190	654	40544	May	277	44	83	5174
June	190	120	138	8284	June	584	74	188	11292
July	350	137	204	12636	July	2290	74	442	26156
Aug.	350	155	161	9960	Aug.	490	88	229	14220
Sept.	270	70	125	7470	Sept.	2790	88	399	23932
Oct.	155	55	73	4530	Oct.	6400	164	811	30282
Nov.	155	30	57	3396	Nov.	1220	102	407	24400
Dec.	155	4	30	1830	Dec.	402	102	149	9216
Total	..	..	..	191786	Total	..	..	..	267560

Year 1955

Year 1956

Jan.	2200	74	391	24380	Jan.	1470	94	244	15110
Feb.	27000	238	3880	217000	Feb.	48500	493	4063	235638
Mar.	4800	728	1589	98548	Mar.	27000	728	2397	148630
Apr.	3360	391	1320	79174	Apr.	1100	184	474	28426
May	6400	299	957	59352	May	17800	184	802	49726
June	728	255	484	29056	June	5200	260	846	50744
July	255	133	196	12126	July	555	221	316	19606
Aug.	213	94	128	7946	Aug.	728	148	284	17592
Sept.	277	76	107	6448	Sept.	148	81	129	7744
Oct.	666	58	167	10356	Oct.	184	81	141	8736
Nov.	391	58	158	9458	Nov.	113	52	89	5346
Dec.	1340	133	286	17762	Dec.	148	26	61	3792
Total	..	..	..	571606	Total	..	..	..	591210

BARRINGTON RIVER AT FORBESDALE

Year 1957

Year 1958

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	148	26	46	2874	Jan.	852	7	108	6666
Feb.	11200	39	816	45710	Feb.	728	59	181	10136
Mar.	5600	148	666	41284	Mar.	394	26	145	9014
Apr.	148	81	109	6560	Apr.	302	52	150	9006
May	81	52	57	3512	May	394	131	173	10718
June	184	45	61	3642	June	2220	148	582	34926
July	221	81	123	7598	July	1500	130	374	23168
Aug.	852	97	261	16156	Aug.	322	98	165	10232
Sept.	302	73	145	8682	Sept.	1320	130	208	12486
Oct.	73	26	47	2918	Oct.	700	130	248	15362
Nov.	26	7	17	1010	Nov.	130	40	78	4700
Dec.	26	6	8	520	Dec.	366	98	170	10544
Total	..	..	..	140466	Total	..	..	..	156958

Year 1959

Year 1960

Jan.	5850	166	1106	68596	Jan.	366	40	137	8484
Feb.	14800	280	1221	68362	Feb.	1380	98	306	17728
Mar.	6400	322	1298	80452	Mar.	2700	280	741	45952
Apr.	2700	280	769	46150	Apr.	580	166	331	19874
May	322	166	265	16400	May	760	130	242	14988
June	610	98	141	8440	June	1130	202	451	27070
July	1960	202	545	33800	July	950	240	432	26810
Aug.	2700	166	644	39946	Aug.	322	166	217	13446
Sept.	640	322	444	26664	Sept.	322	98	203	12162
Oct.	1830	166	601	37272	Oct.	322	98	146	9056
Nov.	9250	366	1444	86630	Nov.	202	54	96	5772
Dec.	525	130	240	14898	Dec.	5600	68	635	39392
Total	..	..	..	527610	Total	..	..	..	240734

BARRINGTON RIVER AT FORBESDALE

Year 1961

Year 1962

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	1440	175	427	26460	Jan.	3600	260	1089	67490
Feb.	1960	98	384	21506	Feb.	1830	300	530	29684
Mar.	416	130	239	14800	Mar.	620	184	276	17132
Apr.	700	98	225	13528	Apr.	12200	184	1386	83136
May	366	98	162	10040	May	6400	184	839	52024
June	3480	130	472	28316	June	300	125	189	11336
July	184	98	126	7832	July	1050	125	271	16810
Aug.	885	98	296	18340	Aug.	740	125	277	17144
Sept.	525	98	281	16842	Sept.	350	125	192	11520
Oct.	470	130	208	12900	Oct.	680	96	151	9352
Nov.	700	98	277	16620	Nov.	475	68	132	7930
Dec.	3120	280	805	49926	Dec.	21000	40	977	60586
Total	..	..	..	237110	Total	..	..	..	384144

Year 1963

Year 1964

Jan.	4320	350	1003	62200	Jan.	300	125	173	10702
Feb.	980	154	407	22782	Feb.	184	68	105	6100
Mar.	31500	260	2786	172720	Mar.	1120	96	267	16560
Apr.	5600	220	894	53630	Apr.	7300	96	622	37300
May	21500	400	2821	174920	May	400	104	215	13300
June	2360	260	563	33808	June	3360	104	408	24500
July	1050	300	445	27560	July	500	140	200	12400
Aug.	350	184	250	15472	Aug.	350	72	125	7770
Sept.	4080	154	751	45086	Sept.	260	88	129	7740
Oct.	800	184	451	27968	Oct.	220	74	118	7310
Nov.	450	154	234	14060	Nov.	152	37	75	4500
Dec.	3600	184	819	50778	Dec.	120	16	33	2020
Total	..	..	..	700984	Total	..	..	..	150202

BARRINGTON RIVER AT FORBESDALE

Year 1965

Year 1966

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	120	12	30	1840	Jan.	88	26	52	3250
Feb.	120	16	48	2670	Feb.	1440	16	134	7520
Mar.	37	12	17	1050	Mar.	680	61	170	10500
Apr.	88	12	27	1630	Apr.	220	37	81	4890
May	120	16	37	2310	May	220	37	86	5320
June	300	16	47	2810	June	350	61	139	8350
July	2520	37	304	18900	July	88	37	54	3330
Aug.	220	74	111	6910	Aug.	220	37	73	4500
Sept.	120	49	83	5010	Sept.	220	61	134	8020
Oct.	184	37	55	3420	Oct.	560	74	174	10800
Nov.	37	16	26	1570	Nov.	1500	120	311	18600
Dec.	1500	61	281	17400	Dec.	184	81	126	7830
Total	..	..	..	65520	Total	..	..	..	92910

Year 1967

Jan.	860	49	189	11700
Feb.	860	120	226	12700
Mar.	7000	260	1000	62200
Apr.	3480	220	928	55700
May	560	152	259	16100
June	5850	152	1930	116000
July	1500	176	426	26400
Aug.	7450	152	545	33800
Sept.	4950	144	493	29600
Oct.	8200	88	852	52800
Nov.	560	88	208	12500
Dec.	152	37	66	4090
Total	..	..	..	433590

GLOUCESTER RIVER AT DOON AYRE

LOCATION: Latitude 30°57' Longitude 152°06'

PERIOD OF ESTABLISHMENT: May 1945 to date.

COMPLETE YEARS OF COMPUTED RECORDS: 20

ZERO OF GAUGE: R.L. 52.20 Assumed Datum.

CATCHMENT AREA: 620 Square Miles

CONTROL: Rock and Gravel

EQUIPMENT: Automatic recorder (Pressure Type) installed July 1953.
Manometer-Servo installed March 1968.
Staff gauge, range 0 to 35 feet.

CURRENT METER OBSERVATIONS:

- (a) Number obtained : 109
- (b) Maximum observation in cusecs : 3,900
- (c) Minimum observation in cusecs : 0.6

MAXIMUM ESTIMATED DISCHARGE DURING PERIOD OF RECORDS: 91,300 cusecs.

MEAN DAILY DISCHARGE FOR 20 YEARS: 800 cusecs.

MEAN ANNUAL DISCHARGE FOR 20 YEARS: 593,000 acre.feet.

GLOUCESTER RIVER AT DOON AYRE

Year 1945

Year 1946

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	..	..	..	..	Jan.	172	13	51	3,192
Feb.	..	..	..	..	Feb.	561	13	200	11,226
Mar.	..	..	..	..	Mar.	49000	95	1373	85,112
Apr.	..	..	..	..	Apr.	50000	207	3022	181,348
May	No. Records			..	May	466	225	315	19,506
June	35500	61	3128	187,702	June	2030	225	566	33,946
July	6600	299	890	55,194	July	642	95	252	15,618
Aug.	338	155	223	13,846	Aug.	109	52	73	4,548
Sept.	262	61	130	7,820	Sept.	124	37	61	3,678
Oct.	299	27	161	10,012	Oct.	95	19	43	2,692
Nov.	796	22	326	19,542	Nov.	489	16	57	3,434
Dec.	926	52	294	18,200	Dec.	61	22	35	2,152
Total	..	..	..	..	Total	..	..	..	366,452

Year 1947

Year 1948

Jan.	466	7	61	3,764	Jan.	578	219	410	25,400
Feb.	9440	61	1649	92,318	Feb.	440	164	244	14,178
Mar.	4360	400	1213	75,190	Mar.	No Records			
Apr.	1030	379	477	28,642	Apr.	No Records			
May	828	155	305	18,938	May	No Records			
June	1170	172	449	26,914	June	No Records			
July	No Records				July	No Records			
Aug.	No Records				Aug.	182	112	146	9,070
Sept.	No Records				Sept.	5600	146	1366	81,944
Oct.	No Records				Oct.	631	95	242	15,030
Nov.	No Records				Nov.	129	47	82	4,914
Dec.	60000	279	4186	259,522	Dec.	95	22	54	3,374
Total	..	..	..	..	Total	..	..	..	..

GLOUCESTER RIVER AT DOON AYRE

Year 1949

Year 1950

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	461	26	146	9,040	Jan.	3420	94	319	19,786
Feb.	4600	37	1140	63,834	Feb.	8920	147	1473	82,464
Mar.	5080	420	1710	106,022	Mar.	980	285	504	31,232
Apr.	4420	164	1011	60,640	Apr.	13300	413	1734	104,018
May	440	229	292	18,100	May	1610	215	618	38,336
June	14000	182	1831	109,888	June	44300	467	9565	573,914
July	38000	200	2453	152,096	July	12550	1750	4919	304,960
Aug.	8920	386	1258	78,022	Aug.	7600	657	1791	111,056
Sept.	2520	1100	1673	100,390	Sept.	3920	467	1169	70,162
Oct.	1680	386	917	56,852	Oct.	2520	386	1240	76,872
Nov.	830	207	413	24,804	Nov.	21400	334	2338	140,252
Dec.	800	109	196	12,148	Dec.	890	190	472	29,288
Total	..	..	..	791,836	Total	..	..	..	1,582,340

Year 1951

Year 1952

Jan.	46000	685	4982	308,888	Jan.	39	6	24	1,476
Feb.	9700	713	1436	80,426	Feb.	3740	2	437	25,374
Mar.	8200	467	1171	72,614	Mar.	2480	207	542	33,600
Apr.	685	190	370	22,180	Apr.	3020	114	614	36,838
May	190	135	166	10,264	May	800	207	317	19,658
June	14300	135	2701	162,070	June	4260	190	634	38,046
July	2480	360	796	49,324	July	1390	174	311	19,274
Aug.	360	190	280	17,366	Aug.	32500	455	5265	326,440
Sept.	243	147	169	10,118	Sept.	433	160	256	15,340
Oct.	154	68	118	7,344	Oct.	358	160	224	13,902
Nov.	68	39	52	3,138	Nov.	190	104	141	8,486
Dec.	44	24	34	2,096	Dec.	114	39	65	4,008
Total	..	..	..	745,828	Total	..	..	..	542,442

GLOUCESTER RIVER AT DOON AYRE

Year 1953

Year 1954

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	1200	114	389	24124	Jan.	NO RECORDS			10700*
Feb.	7840	160	1407	78806	Feb.	70000	39	2466	138088
Mar.	6800	289	1028	63718	Mar.	1540	141	452	27996
Apr.	1030	190	341	20452	Apr.	147	68	105	6276
May.	9310	207	1269	78676	May	262	76	123	7596
June	243	135	168	10062	June	732	114	216	12976
July	461	124	192	11926	July	1900	94	422	26170
Aug.	262	135	163	10126	Aug.	710	114	286	17634
Sept.	254	104	154	9238	Sept.	1660	104	316	18934
Oct.	NO RECORDS			4530*	Oct.	6000	214	1019	63206
Nov.	NO RECORDS			3640*	Nov.	5240	202	944	56648
Dec.	NO RECORDS			1990*	Dec.	NO RECORDS			12990*
Total	..	..	..	317288*	Total	..	..	..	399194*

Year 1955

Year 1956

Jan.	5160	141	596	36936	Jan.	2060	85	275	17052
Feb.	30400	372	2448	137104	Feb.	60000	617	6625	384278
Mar.	6500	816	3127	193870	Mar.	91300	1465	4993	309590
Apr.	13300	606	2390	143394	Apr.	1465	284	782	46898
May	12600	393	1937	120088	May	1085	284	712	44152
June	1360	333	499	29916	June	15500	426	2798	167876
July	333	127	215	13336	July	730	263	479	29706
Aug.	190	160	174	10776	Aug.	975	178	435	26990
Sept.	182	109	141	8434	Sept.	223	132	170	10172
Oct.	493	30	166	10268	Oct.	328	114	173	10752
Nov.	333	52	149	8920	Nov.	223	60	103	6188
Dec.	3010	114	436	27004	Dec.	170	42	81	5050
Total	..	..	..	740046	Total	..	..	..	1058704

* Estimated

GLOUCESTER RIVER AT DOON AYRE

Year 1957

Year 1958

Month	Discharge in Cusecs			Discharge For Month Acre Feet	Month	Discharge in Cusecs			Discharge For Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	126	29	61	3760	Jan.	1370	1.3	107	6620
Feb.	31000	42	1792	100346	Feb.	1900	103	526	29464
Mar.	50000	204	1522	94358	Mar.	2580	92	421	26074
Apr.	204	120	161	9636	Apr.	328	92	184	11054
May.	120	68	86	5356	May	351	114	207	12862
June	186	56	74	4450	June	3540	114	648	38874
July	273	73	136	8406	July	3220	146	540	33506
Aug.	1200	114	307	19060	Aug.	263	126	179	11098
Sept.	583	87	221	13232	Sept.	478	103	167	10008
Oct.	87	23	51	3146	Oct.	387	108	267	16582
Nov.	114	4	22	1338	Nov.	154	42	74	4416
Dec.	12	0.2	2.9	178	Dec.	790	92	252	15604
Total				263266	Total				216162

Year 1959

Year 1960

Jan.	13500	170	1419	87984	Jan.	1480	73	271	16782
Feb.	11700	305	1402	78520	Feb.	3020	114	428	24826
Mar.	20000	560	2444	151504	Mar.	5900	426	1339	83044
Apr.	3700	532	1210	72624	Apr.	880	223	405	24296
May	387	213	318	19708	May	880	154	261	16210
June	2050	139	248	14890	June	2580	263	623	37384
July	1260	263	602	37320	July	1100	284	555	34436
Aug.	1820	339	584	36218	Aug.	426	186	259	16034
Sept.	685	400	589	35342	Sept.	452	126	213	12798
Oct.	5600	263	1207	74832	Oct.	532	126	166	10302
Nov.	16500	478	2294	137660	Nov.	305	49	94	5626
Dec.	2900	223	404	25046	Dec.	7130	56	801	49662
Total				771648	Total				331400

GLOUCESTER RIVER AT DOON AYRE

Year 1961

Year 1962

Month	Discharge in Cusecs			Discharge For Month Acres Feet	Month	Discharge in Cusecs			Discharge for Month Acres Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	975	186	313	19432	Jan.	10900	426	2694	167000
Feb.	3220	114	554	31012	Feb.	4160	400	941	52700
Mar.	478	186	306	18994	Mar.	1410	263	548	34000
Apr.	1230	126	233	13992	Apr.	30500	263	3592	216000
May	284	126	178	11044	May	15000	305	1682	104000
June	19000	186	1140	68384	June	478	204	297	17800
July	328	120	189	11746	July	2460	170	459	28400
Aug.	1300	103	383	23764	Aug.	910	170	355	22000
Sept.	642	186	441	26450	Sept.	587	170	279	16800
Oct.	1450	139	436	27016	Oct.	820	114	194	12000
Nov.	1230	126	378	22702	Nov.	426	56	169	10200
Dec.	6800	375	1386	85956	Dec.	36000	64	2281	141000
Total	..	..	..	360492	Total	..	..	..	821900

Year 1963

Year 1964

Jan.	10200	328	1599	96700	Jan.	587	192	320	19800
Feb.	1370	305	656	36700	Feb.	210	98	155	9008
Mar.	NO RECORDS			380000*	Mar.	1040	109	382	23700
Apr.	NO RECORDS			120000*	Apr.	3700	132	570	34200
May	NO RECORDS			380000*	May	560	176	298	18450
June	NO RECORDS			76000*	June	2620	160	425	25500
July	1370	587	840	52100	July	345	160	219	13600
Aug.	6100	295	600	37200	Aug.	910	78	181	11200
Sept.	10900	210	1280	76800	Sept.	345	88	150	9000
Oct.	1370	295	672	41600	Oct.	160	69	109	6760
Nov.	790	270	428	25000	Nov.	109	30	62	3770
Dec.	10300	270	1633	101000	Dec.	36	7	20	1270
Total	..	..	..	1423100*	Total	..	..	..	176258

* Estimated

GLOUCESTER RIVER AT DOON AYRE

Year 1965

Year 1966

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	109	5	25	1530	Jan.	98	25	48	2960
Feb.	60	25	45	2590	Feb.	1670	25	175	9800
Mar.	25	1	9	582	Mar.	700	60	184	11400
Apr.	44	0.2	13	782	Apr.	250	60	102	6120
May.	44	15	27	1670	May	192	69	115	7140
June	146	11	26	1550	June	270	109	152	9100
July	2940	44	360	22300	July	98	30	61	3810
Aug.	230	88	120	7440	Aug.	176	30	59	3670
Sept.	132	52	88	5280	Sept.	250	88	159	9540
Oct.	370	36	58	3610	Oct.	670	88	210	13000
Nov.	60	6	23	1350	Nov.	2500	176	356	21350
Dec.	2350	11	419	26000	Dec.	560	78	184	11430
Total				74684	Total				109320

Year 1967

Jan.	1370	78	179	11100
Feb.	1330	120	287	16100
Mar.	24110	270	1800	112000
Apr.	6100	370	1660	99600
May	1200	250	456	28300
June	No	Records		200000*
July	2400	320	761	47200
Aug.	12250	320	1000	62000
Sept.	3960	230	708	42500
Oct.	37000	132	1755	109000
Nov.	850	132	412	24700
Dec.	230	60	118	7320
Total				759800*

*Estimated

MANNING RIVER AT KILLAWARRA.

LOCATION: Latitude 31°55' Longitude 151°53'

PERIOD OF ESTABLISHMENT: June 1945 to date.

COMPLETE YEARS OF COMPUTED RECORDS: 20

ZERO OF GAUGE: R.L. 12.33 Assumed Datum.

CATCHMENT AREA: 2,530 Square Miles.

CONTROL: Rock and gravel.

EQUIPMENT: Automatic recorder (Pressure Type) installed October 1962.
Staff gauge, range 0 to 50 feet.

CURRENT METER OBSERVATIONS:

(a) Number obtained	:	129
(b) Maximum observation in cusecs	:	154,000
(c) Minimum observation in cusecs	:	4

MAXIMUM ESTIMATED DISCHARGE DURING PERIOD OF RECORDS: 234,000 cusecs.

MEAN DAILY DISCHARGE FOR 20 YEARS: 2,800 cusecs.

MEAN ANNUAL DISCHARGE FOR 20 YEARS: 2,078,000 acre feet.

MANNING RIVER AT KILLAWARRA

Year 1945

Year 1946

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	..	..	..	..	Jan.	168	47	106	6,582
Feb.	..	..	..	..	Feb.	1210	11	128	7,152
Mar.	..	..	..	..	Mar.	131200	143	5360	332,000
Apr.	..	..	..	..	Apr.	96100	550	7040	422,416
May	..	..	..	..	May	1270	328	657	40,744
June	82600	155	9242	554,498	June	4340	328	1688	101,302
July	44200	550	4267	264,586	July	2250	131	453	28,086
Aug.	1150	600	800	49,580	Aug.	131	131	131	8,122
Sept.	750	216	411	24,654	Sept.	235	131	157	9,454
Oct.	750	168	268	16,598	Oct.	131	15	62	3,826
Nov.	1560	97	352	21,096	Nov.	1800	7	341	20,478
Dec.	3400	155	605	37,524	Dec.	461	29	109	6,730
Total	..	..	..	..	Total	..	..	..	986,892

Year 1947

Year 1948

Jan.	1040	4	88	5,426	Jan.	6020	1100	2286	141,740
Feb.	35300	131	4583	256,642	Feb.	1390	328	726	42,124
Mar.	28200	500	3482	215,890	Mar.	7050	600	2536	157,220
Apr.	4700	500	1374	82,460	Apr.	1500	358	678	40,672
May	750	358	492	30,478	May	27450	461	3973	246,374
June	3200	328	1304	78,220	June	46000	302	9339	560,314
July	302	216	261	16,152	July	1680	920	1101	68,280
Aug.	358	199	249	15,420	Aug.	1800	500	981	60,820
Sept.	2520	216	552	33,098	Sept.	14500	500	3231	193,840
Oct.	750	216	340	21,064	Oct.	2430	216	956	59,266
Nov.	390	199	246	14,764	Nov.	216	216	216	12,960
Dec.	94750	277	11940	740,274	Dec.	216	87	146	9,044
Total	..	..	..	1,509,888	Total	..	..	..	1,592,654

MANNING RIVER AT KILLAWARRA

Year 1949

Year 1950

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	2090	87	753	46,690	Jan.	3400	277	871	53,996
Feb.	26700	277	3087	172,882	Feb.	16780	277	4452	249,314
Mar.	7950	1210	3000	185,720	Mar.	4400	750	1726	107,020
Apr.	No Records			215,000*	Apr.	31600	750	4295	257,674
May	No Records			65,000*	May	4460	1150	2363	146,520
June	No Records			260,000*	June	180000	1150	36900	2,220,000
July	127500	600	8690	539,000	July	54000	3600	15662	971,020
Aug.	77100	750	8180	507,150	Aug.	20800	2520	7216	447,406
Sept.	12110	2010	6020	361,190	Sept.	10460	1680	3523	211,360
Oct.	8100	1270	2767	171,532	Oct.	12300	1620	3830	237,450
Nov.	4580	700	1257	75,420	Nov.	46000	1450	7672	460,330
Dec.	2800	358	1254	77,732	Dec.	5090	1210	2335	144,790
Total	..	..	..	2,677,316*	Total	..	..	..	5,506,880

Year 1951

Year 1952

Jan.	112100	1800	14726	912,996	Jan.	277	97	143	8,854
Feb.	15300	2250	5251	294,060	Feb.	10640	34	1141	66,176
Mar.	19600	1620	4689	290,710	Mar.	13210	500	3218	199,540
Apr.	3400	1040	1512	90,750	Apr.	4220	500	1604	96,230
May	980	750	800	49,600	May	1680	461	857	53,148
June	44350	750	9878	597,684	June	6300	650	1849	110,960
July	12300	1530	3015	186,940	July	2610	650	1026	63,640
Aug.	3900	1070	1497	92,800	Aug.	109500	2010	13800	857,000
Sept.	1040	600	777	46,640	Sept.	2010	724	1170	70,224
Oct.	700	358	467	28,978	Oct.	2380	597	941	58,328
Nov.	358	183	234	14,060	Nov.	597	381	483	28,978
Dec.	216	131	163	10,118	Dec.	557	153	244	15,122
Total	..	..	..	2,615,336	Total	..	..	..	1,628,200

* Estimated.

MANNING RIVER AT KILLAWARRA

Year 1953

Year 1954

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	1730	482	651	40,372	Jan.	2160	55	447	27,684
Feb.	33400	292	4812	269,462	Feb.	125600	92	5520	309,000
Mar.	15800	768	2938	182,178	Mar.	4050	350	1215	75,304
Apr.	2160	557	963	57,762	Apr.	381	244	297	17,814
May	19600	557	3129	194,010	May	482	161	211	13,060
June	814	482	577	34,638	June	2010	292	748	44,874
July	2380	397	625	38,736	July	7300	223	1220	75,646
Aug.	1230	381	569	35,280	Aug.	768	267	561	34,756
Sept.	910	350	463	27,772	Sept.	18500	200	2112	126,730
Oct.	500	186	278	17,238	Oct.	37500	910	5274	326,996
Nov.	244	75	150	8,986	Nov.	22200	768	448	268,920
Dec.	138	39	62	3,814	Dec.	1280	519	835	51,768
Total	..	..	..	910,248	Total	..	..	..	1,372,552

Year 1955

Year 1956

Jan.	6150	320	1381	85,634	Jan.	6150	267	1101	68,276
Feb.	135600	910	18600	1,040,000	Feb.	233700	1660	22100	1,280,000
Mar.	34000	6600	10404	645,064	Mar.	233700	5090	21700	1,350,000
Apr.	32000	3000	9685	581,114	Apr.	10600	1400	3935	236,120
May	35300	1570	5116	317,220	May	56100	1400	5528	342,740
June	2230	1280	1652	99,120	June	26700	1190	3659	219,550
July	1230	768	982	60,884	July	3740	1145	2024	125,474
Aug.	935	597	719	44,602	Aug.	6045	824	2026	125,594
Sept.	724	519	603	36,176	Sept.	923	569	717	43,028
Oct.	4050	350	971	60,172	Oct.	No Records			34,000*
Nov.	1470	350	696	41,772	Nov.	No Records			24,000*
Dec.	3690	519	1107	68,618	Dec.	No Records			40,000*
Total	..	..	..	3,080,376	Total	..	..	..	3,888,782*

* Estimated.

MANNING RIVER AT KILLAWARRA

Year 1957

Year 1958

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.		No	Records		Jan.	5590	33	551	34,138
Feb.		No	Records		Feb.	5850	275	1103	61,772
Mar.		No	Records		Mar.	4860	204	610	37,814
Apr.		No	Records		Apr.	722	142	374	22,422
May		No	Records		May	860	237	361	22,404
June		No	Records		June	10600	220	1527	91,644
July		No	Records		July	4400	330	1012	62,758
Aug.		No	Records		Aug.	1020	255	519	32,148
Sept.	1020	210	469	28,140	Sept.	4070	369	631	37,838
Oct.	210	94	138	8,580	Oct.	1640	396	711	44,104
Nov.	168	15	87	5,222	Nov.	369	142	227	13,622
Dec.	77	6	37	2,312	Dec.	3000	142	551	34,166
Total	..	..	..	..	Total	..	..	..	494,830

Year 1959

Year 1960

Jan.	29800	369	3188	197,656	Jan.	1930	430	870	53,916
Feb.	51500	1020	5483	307,062	Feb.	4980	540	1427	82,752
Mar.	34300	1410	6984	433,000	Mar.	11600	1150	3530	218,860
Apr.	10940	1350	3057	183,440	Apr.	1640	700	1063	63,760
May	1150	580	859	53,270	May	1860	500	742	46,020
June	4740	465	681	40,854	June	3850	800	1317	78,990
July	5590	580	1920	119,052	July	3850	900	1906	118,148
Aug.	16300	660	2522	156,360	Aug.	1495	580	897	55,590
Sept.	3125	1000	1543	92,600	Sept.	725	430	569	34,112
Oct.	12700	1000	3070	190,320	Oct.	No	Records		34,000*
Nov.	70600	1325	9223	553,362	Nov.	No	Records		21,000*
Dec.	4180	950	1455	90,226	Dec.	No	Records		110,000*
Total	..	..	..	2,417,202	Total	..	..	..	917,148*

* Estimated.

MANNING RIVER AT KILLAWARRA

Year 1961

Year 1962

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	No Records				Jan.	59800	1640	13093	811,740
Feb.	No Records				Feb.	No Records			150,000*
Mar.	No Records				Mar.	2800	678	1494	92,604
Apr.	1020	255	427	25,594	Apr.	106000	860	25184	1,511,040
May	522	318	405	25,138	May	55800	1330	5960	369,510
June	12200	396	2551	153,062	June	3310	722	1620	97,200
July	970	598	726	44,996	July	26000	455	2950	183,000
Aug.	No Records				Aug.	2200	598	1200	74,500
Sept.	No Records				Sept.	1190	598	792	47,500
Oct.	No Records				Oct.	2420	380	650	40,300
Nov.	No Records				Nov.	1580	355	559	33,600
Dec.	9100	598	3339	207,036	Dec.	85100	280	5460	338,000
Total	..	..	..	..	Total	..	..	..	3,748,994*

Year 1963

Year 1964

Jan.	46000	1050	5250	326,000	Jan.	8930	740	1440	89,500
Feb.	3420	800	1760	98,600	Feb.	1200	620	730	42,300
Mar.	135000	900	20600	1,280,000	Mar.	7930	660	1530	94,600
Apr.	135000	1470	10300	619,000	Apr.	10100	500	1730	104,000
May	136800	3420	20500	1,270,000	May	1200	540	844	52,300
June	4070	1780	2540	153,000	June	6380	540	1230	74,000
July	2520	1300	2170	134,000	July	3300	620	987	61,200
Aug.	4520	1050	1450	89,900	Aug.	3850	500	690	42,800
Sept.	5720	580	1850	111,000	Sept.	740	400	522	31,300
Oct.	3300	1300	1840	114,000	Oct.	1000	310	515	32,000
Nov.	2960	1000	1400	84,000	Nov.	430	197	279	16,800
Dec.	16300	780	3210	199,000	Dec.	400	55	141	8,720
Total	..	..	..	4,478,500	Total	..	..	..	649,520

* Estimated.

MANNING RIVER AT KILLAWARRA

Year 1965

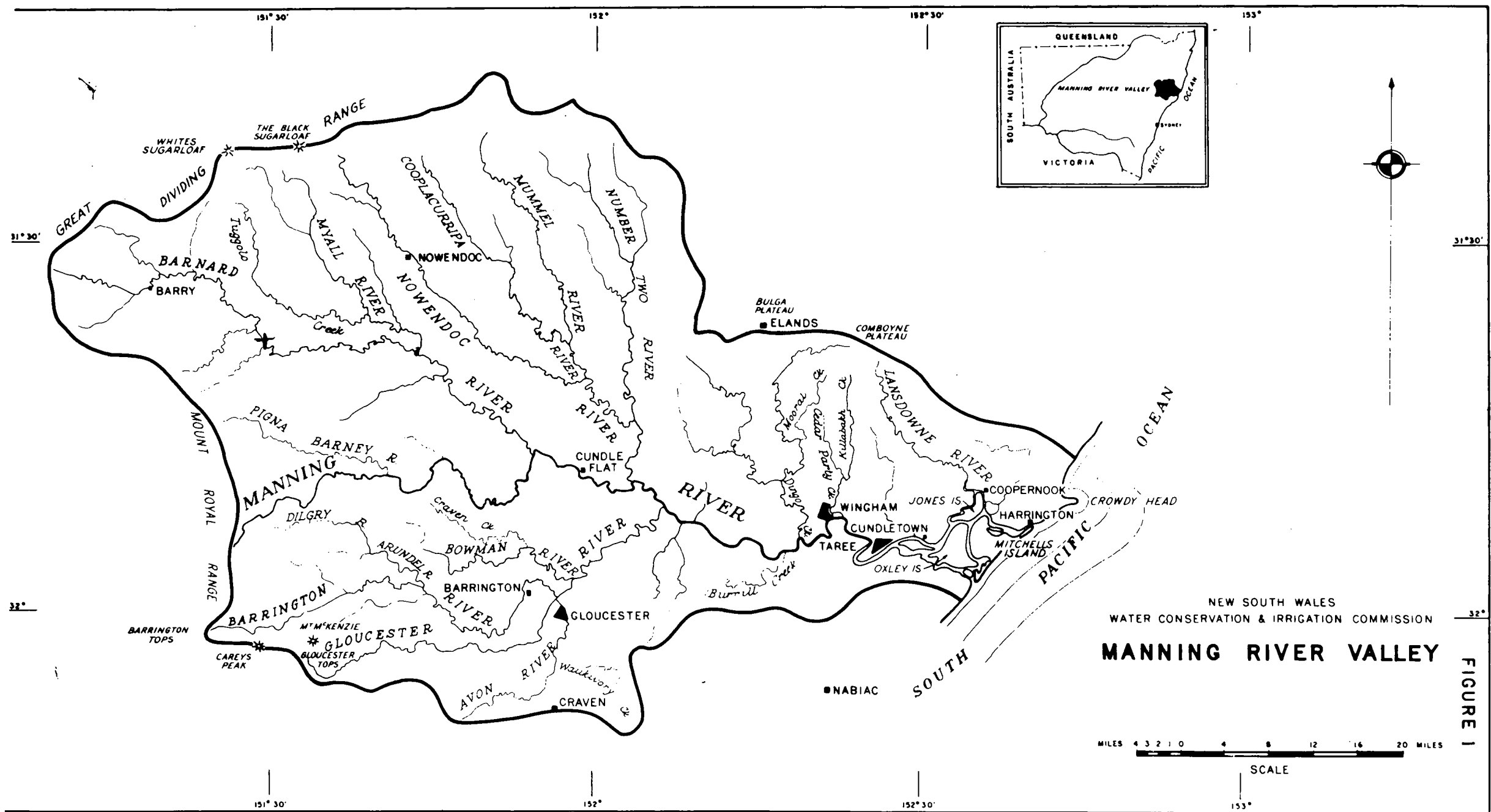
Year 1966

Month	Discharge in Cusecs			Discharge for Month Acre Feet	Month	Discharge in Cusecs			Discharge for Month Acre Feet
	Max.	Min.	Mean			Max.	Min.	Mean	
Jan.	400	29	119	7,370	Jan.	197	34	109	6,760
Feb.	340	72	183	10,200	Feb.	3180,	29	355	19,900
Mar.	145	16	55	3,410	Mar.	5220	103	547	33,900
Apr.	215	13	67	4,020	Apr.	1520	130	438	26,300
May	145	63	94	5,820	May	430	115	217	13,500
June	340	40	77	4,640	June	500	162	261	15,600
July	19600	103	1405	87,100	July	180	92	135	8,400
Aug.	540	235	331	20,500	Aug.	310	115	182	11,300
Sept.	460	115	280	16,800	Sept.	400	145	227	13,600
Oct.	700	92	144	8,930	Oct.	820	162	367	22,800
Nov.	215	6.5	71	4,260	Nov.	7100	235	813	48,800
Dec.	4860	6.5	957	59,400	Dec.	NO RECORDS			17,600*
Total	..	..	..	232,450	Total	..	..	..	238,460*

Year 1967

Jan.	1410	115	445	27,600
Feb.	2420	235	602	33,700
Mar.	NO RECORDS			350,000*
Apr.	NO RECORDS			300,000*
May	2320	580	1015	62,900
June	NO RECORDS			600,000*
July	13700	1100	2810	175,000
Aug.	42400	950	3630	225,000
Sept.	21300	760	2480	149,000
Oct.	135600	580	9484	588,000
Nov.	3520	522	1280	76,700
Dec.	836	275	426	26,400
Total	..	..	..	2,614,300*

* Estimated



NEW SOUTH WALES
 WATER CONSERVATION & IRRIGATION COMMISSION

MANNING RIVER VALLEY



FIGURE 1

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
151° 30'

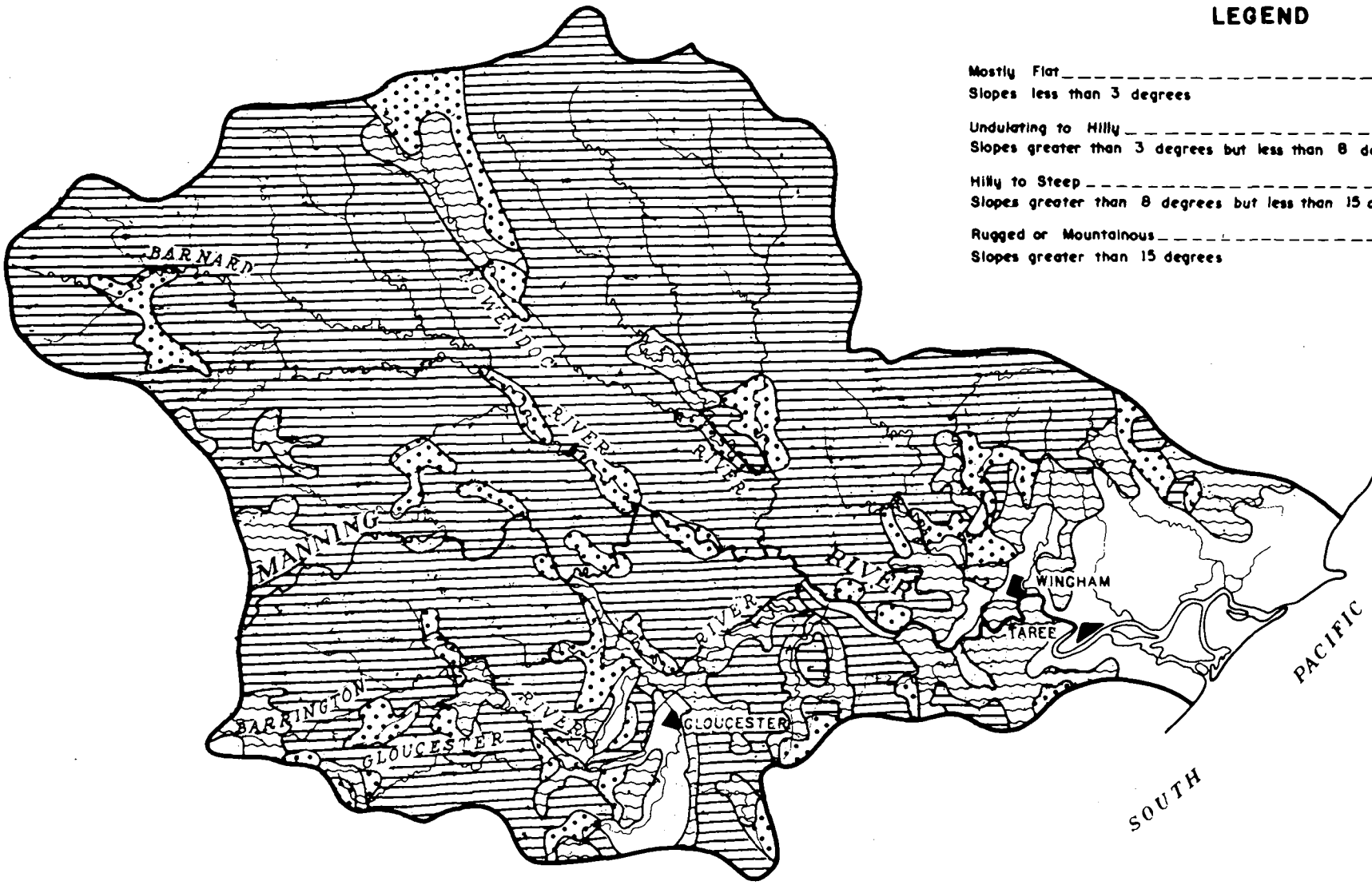
152°

152° 30'

153°

LEGEND

- Mostly Flat  Slopes less than 3 degrees
- Undulating to Hilly  Slopes greater than 3 degrees but less than 8 degrees
- Hilly to Steep  Slopes greater than 8 degrees but less than 15 degrees
- Rugged or Mountainous  Slopes greater than 15 degrees



31° 30'

31° 30'

OCEAN

PACIFIC

SOUTH

NEW SOUTH WALES
WATER CONSERVATION & IRRIGATION COMMISSION

MANNING RIVER VALLEY

LAND SLOPES

MILES 4 3 2 1 0 4 8 12 16 20 MILES

SCALE

151° 30'

152°

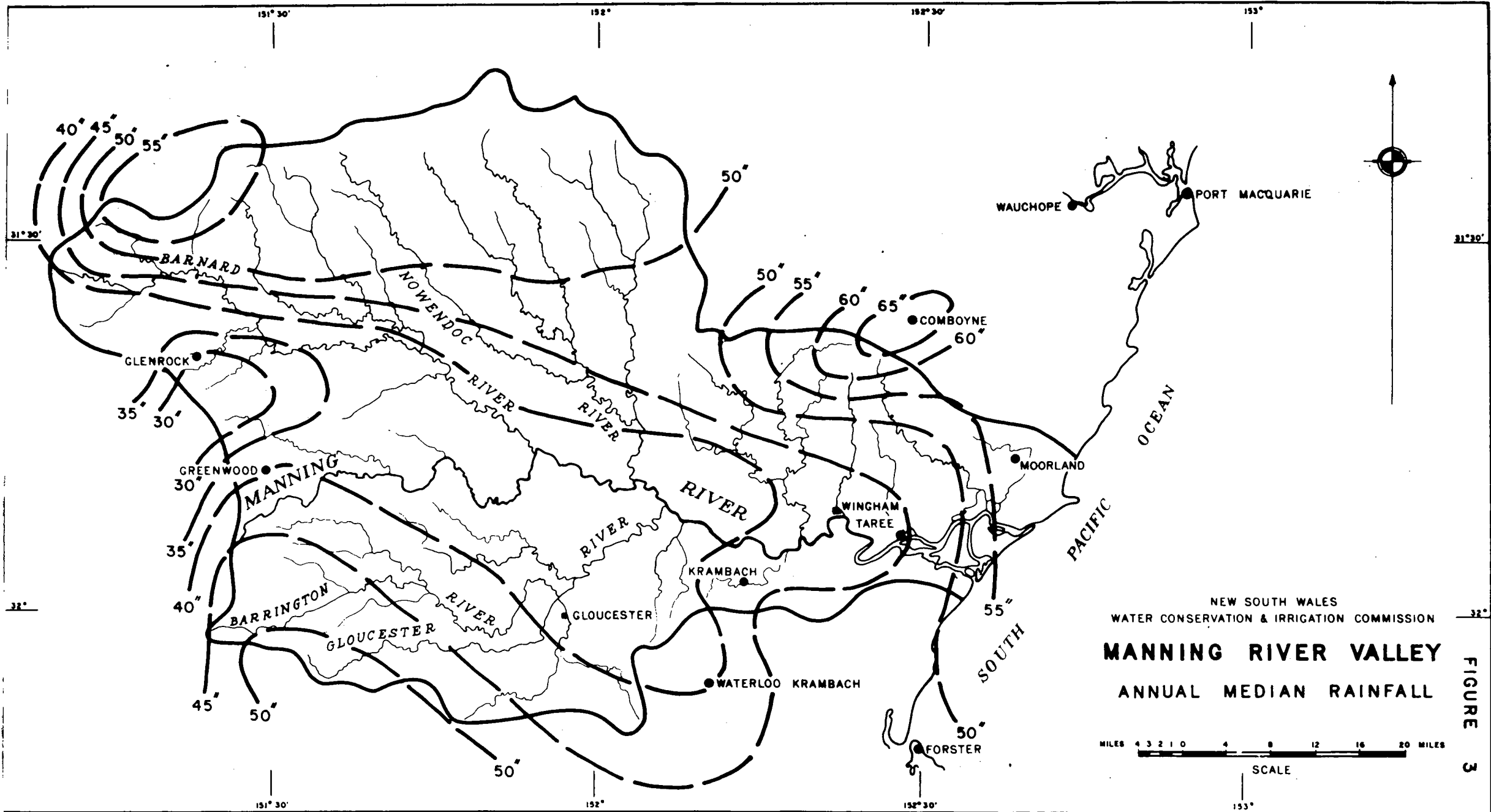
152° 30'

153°

139

32°

FIGURE 2

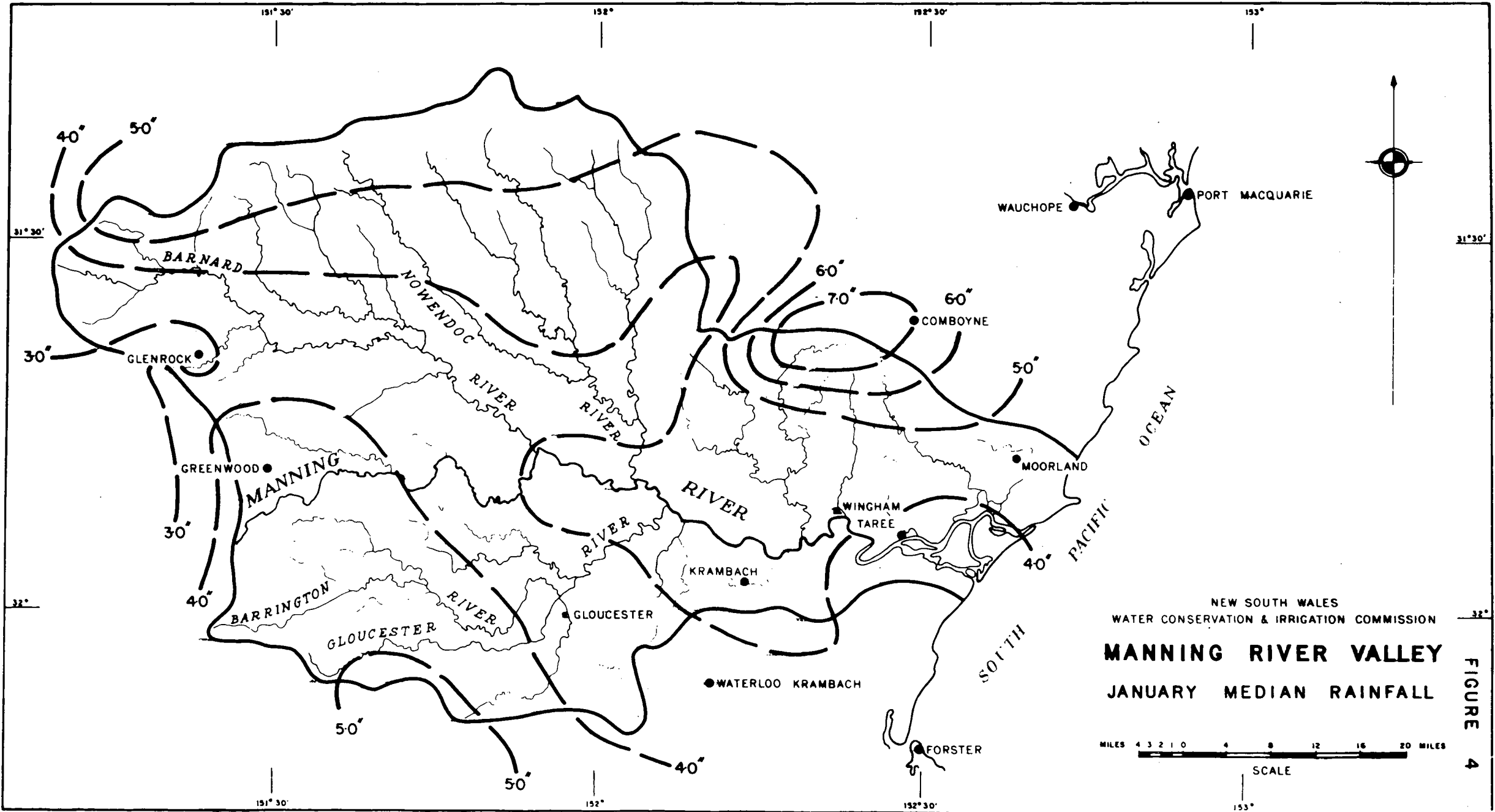


NEW SOUTH WALES
 WATER CONSERVATION & IRRIGATION COMMISSION

MANNING RIVER VALLEY
ANNUAL MEDIAN RAINFALL



FIGURE 3

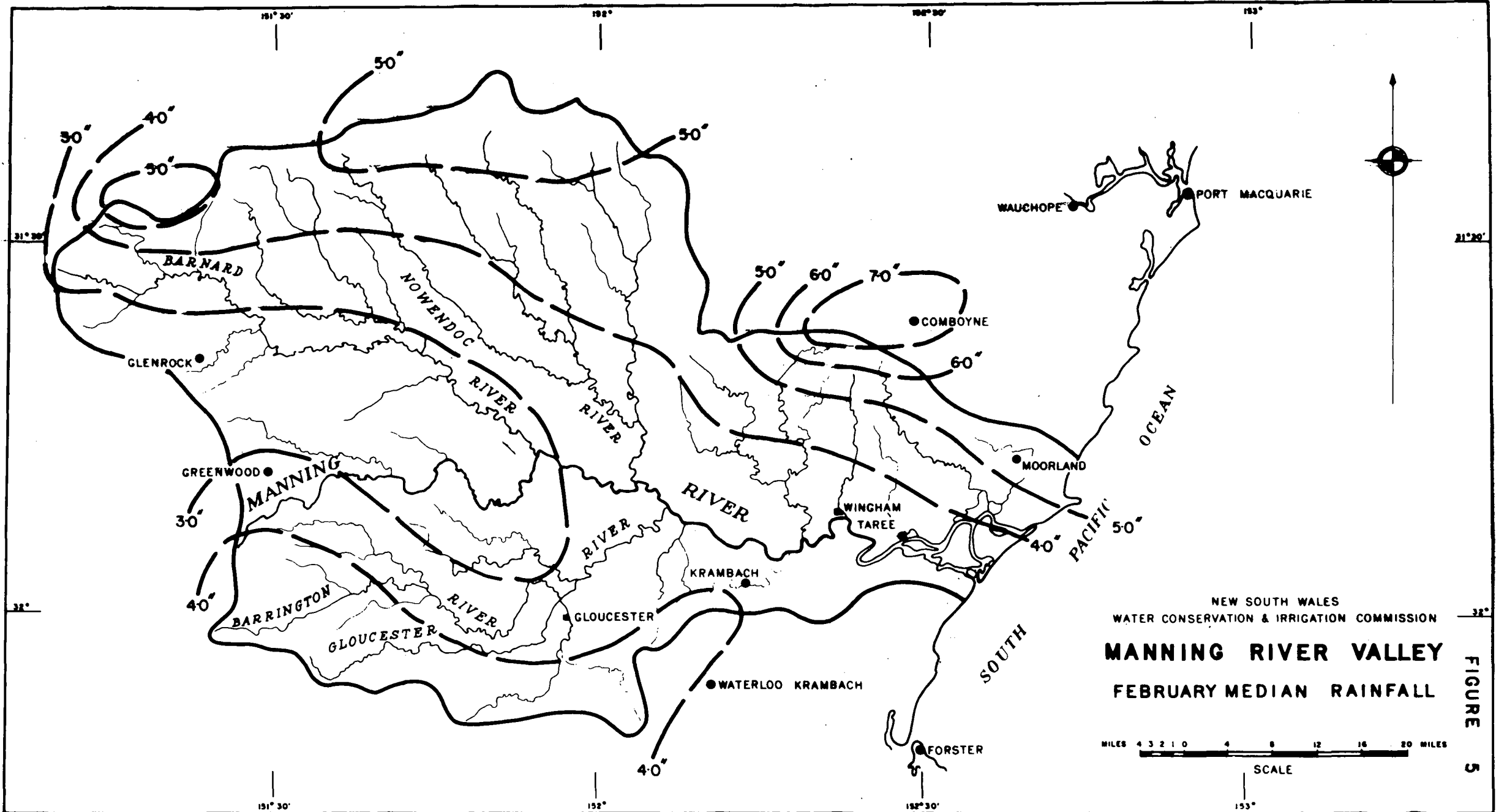


NEW SOUTH WALES
 WATER CONSERVATION & IRRIGATION COMMISSION

MANNING RIVER VALLEY
JANUARY MEDIAN RAINFALL



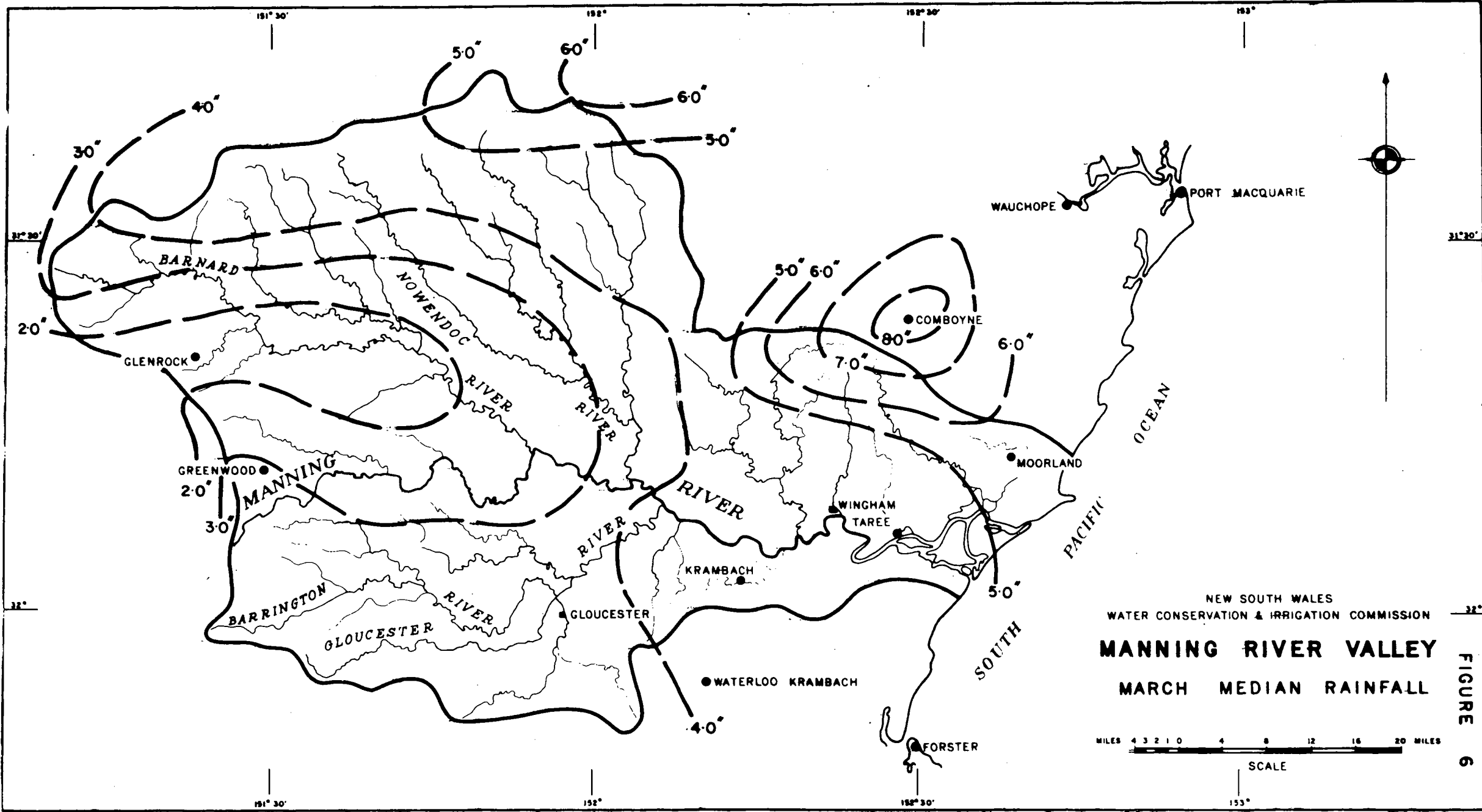
FIGURE 4



NEW SOUTH WALES
 WATER CONSERVATION & IRRIGATION COMMISSION
MANNING RIVER VALLEY
 FEBRUARY MEDIAN RAINFALL

MILES 4 3 2 1 0 4 8 12 16 20 MILES
 SCALE

FIGURE 5



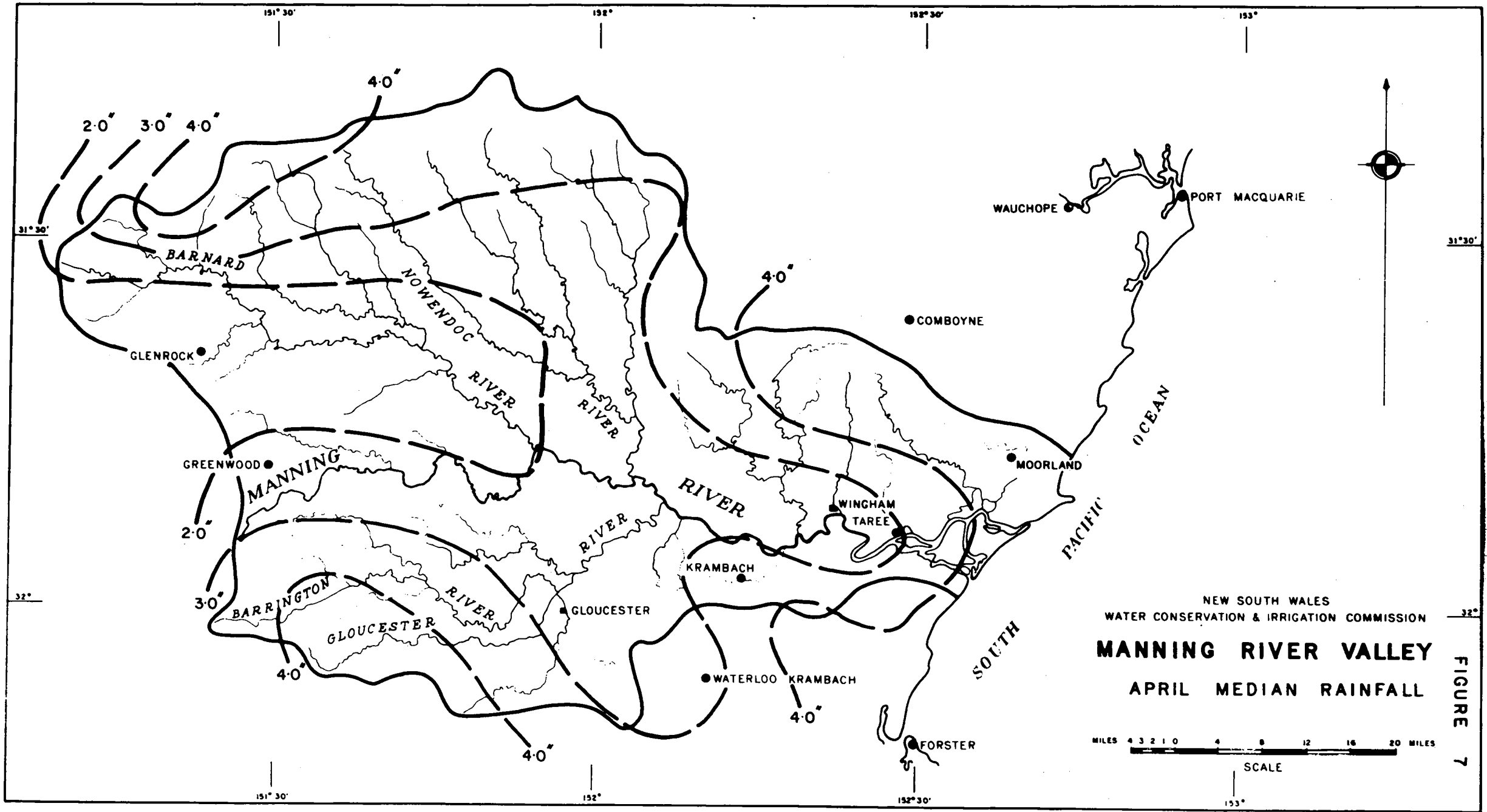
NEW SOUTH WALES
 WATER CONSERVATION & IRRIGATION COMMISSION

MANNING RIVER VALLEY
MARCH MEDIAN RAINFALL

MILES 4 3 2 1 0 4 8 12 16 20 MILES
 SCALE

FIGURE 6

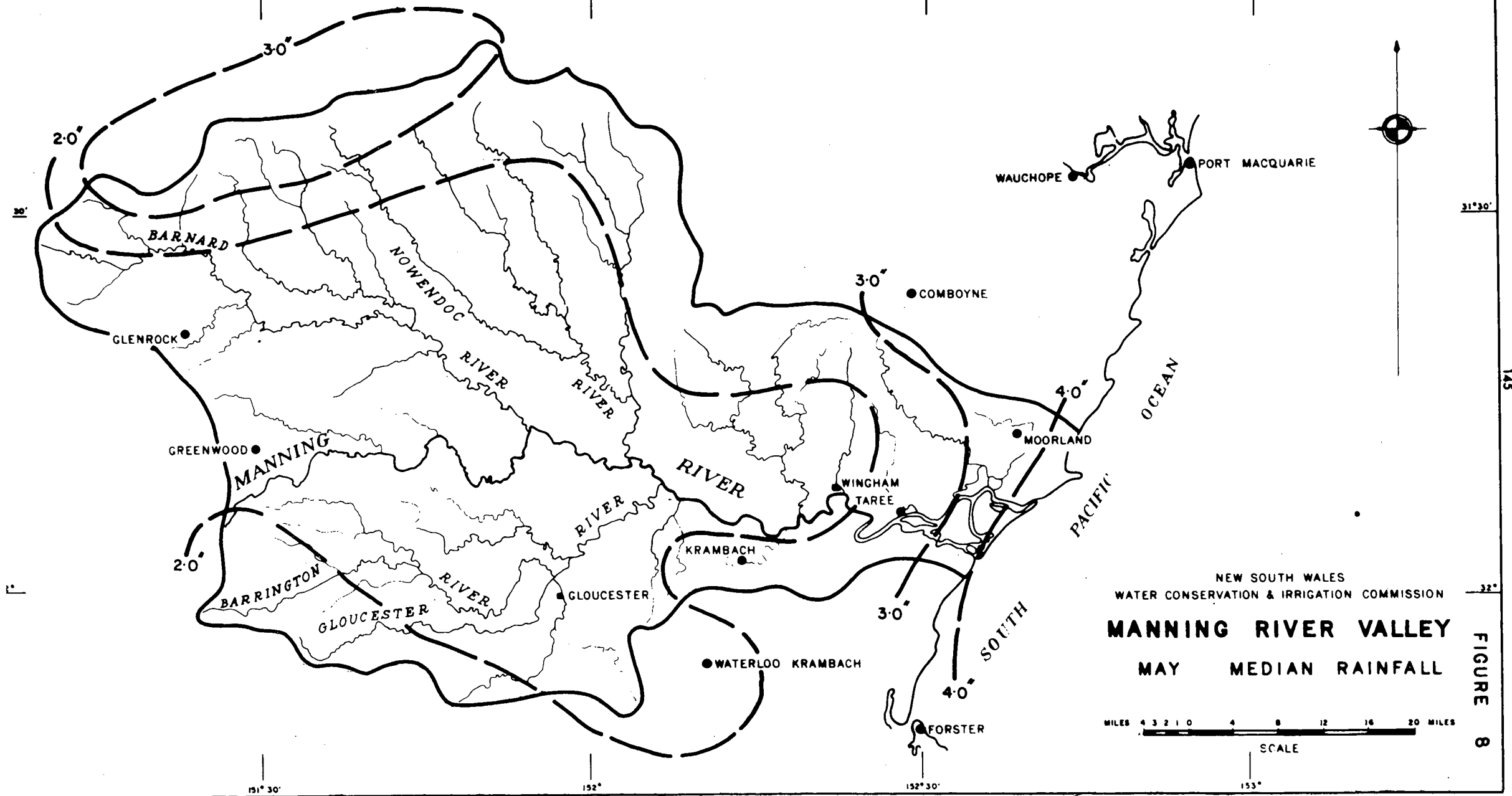
143



NEW SOUTH WALES
 WATER CONSERVATION & IRRIGATION COMMISSION
MANNING RIVER VALLEY
 APRIL MEDIAN RAINFALL

FIGURE 7

MILES 4 3 2 1 0 4 8 12 16 20 MILES
 SCALE

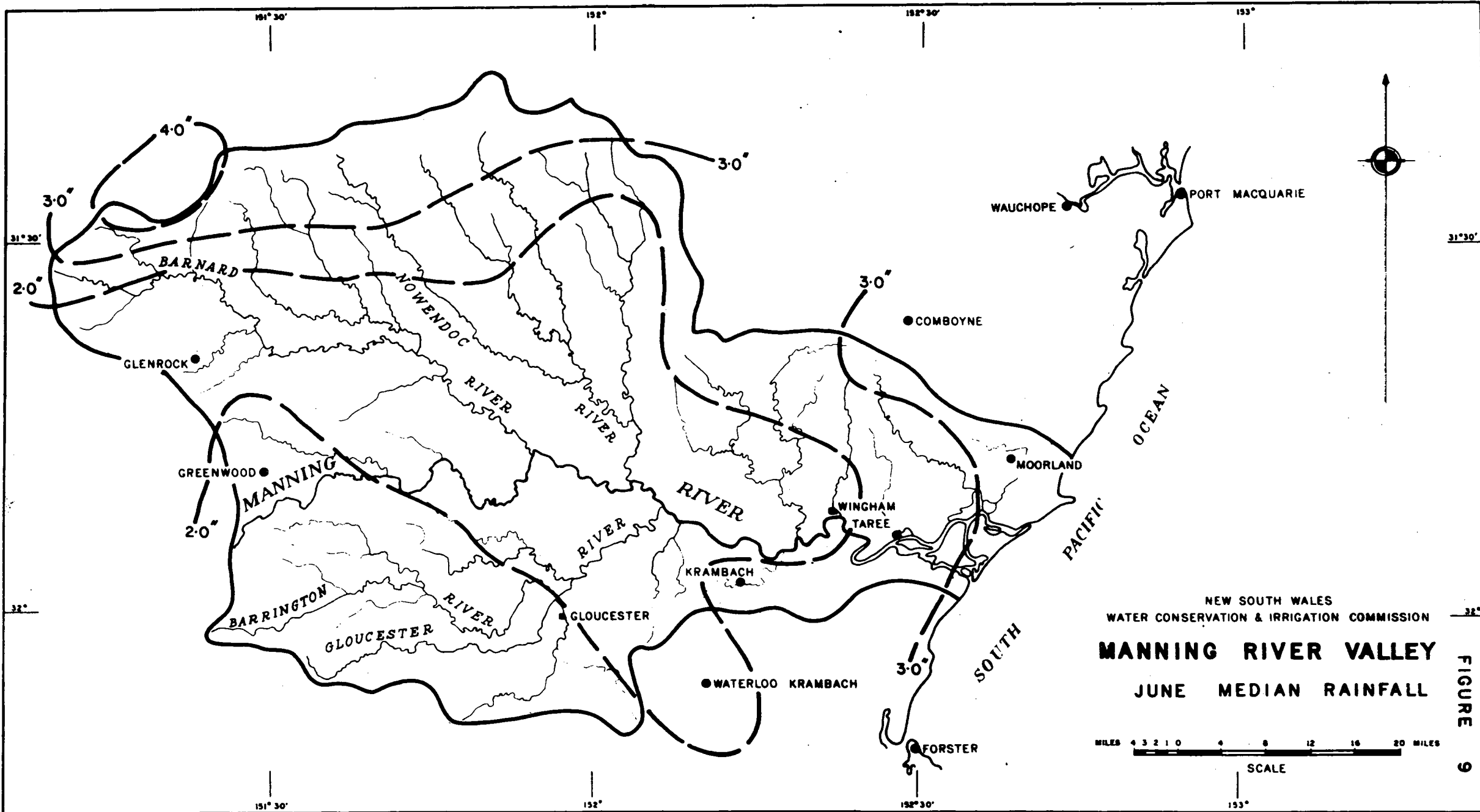


NEW SOUTH WALES
 WATER CONSERVATION & IRRIGATION COMMISSION

MANNING RIVER VALLEY
 MAY MEDIAN RAINFALL

MILES 4 3 2 1 0 4 8 12 16 20 MILES
 SCALE

FIGURE 8



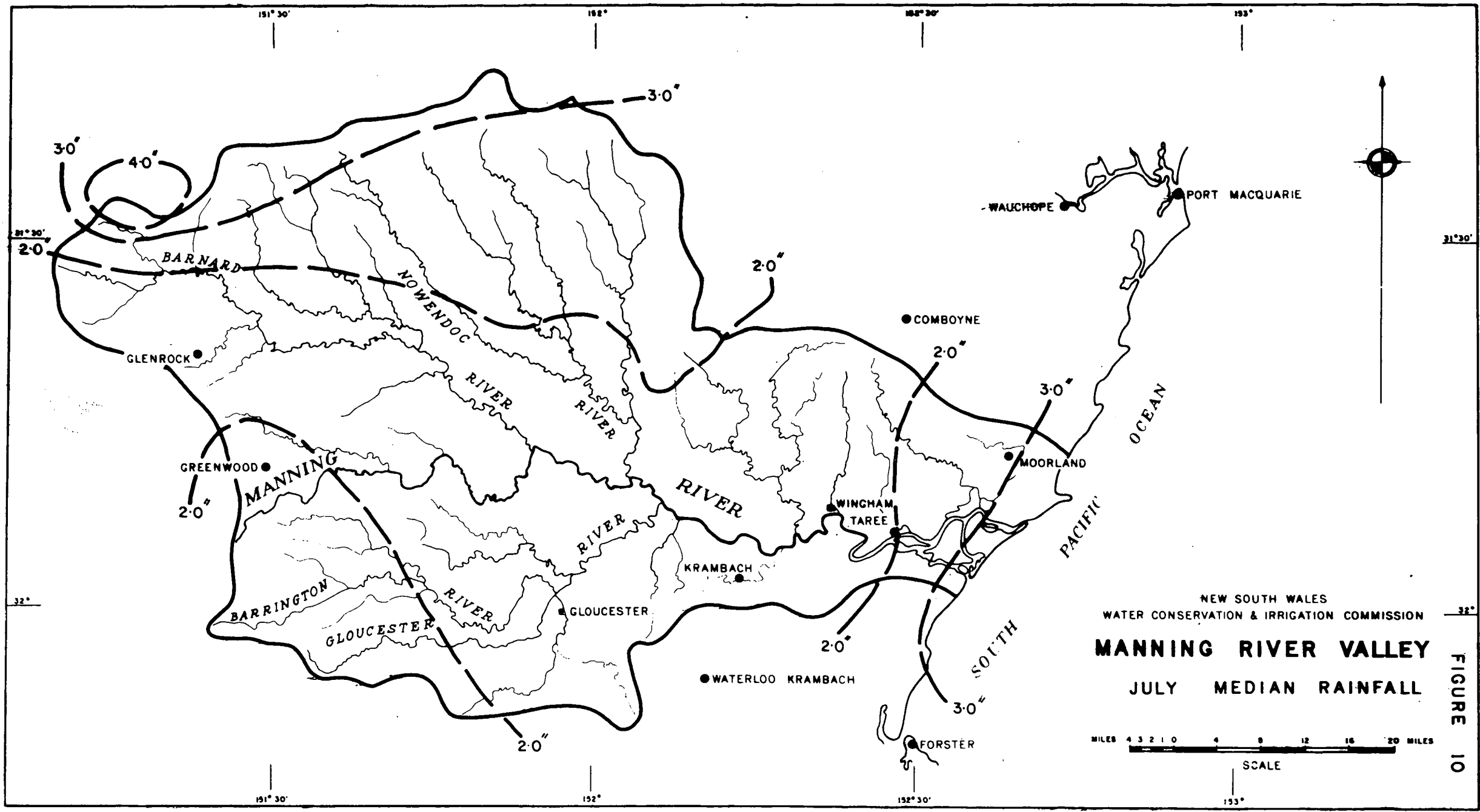
NEW SOUTH WALES
 WATER CONSERVATION & IRRIGATION COMMISSION

MANNING RIVER VALLEY
JUNE MEDIAN RAINFALL

MILES 0 3 2 1 0 4 8 12 16 20 MILES
 SCALE

FIGURE 9

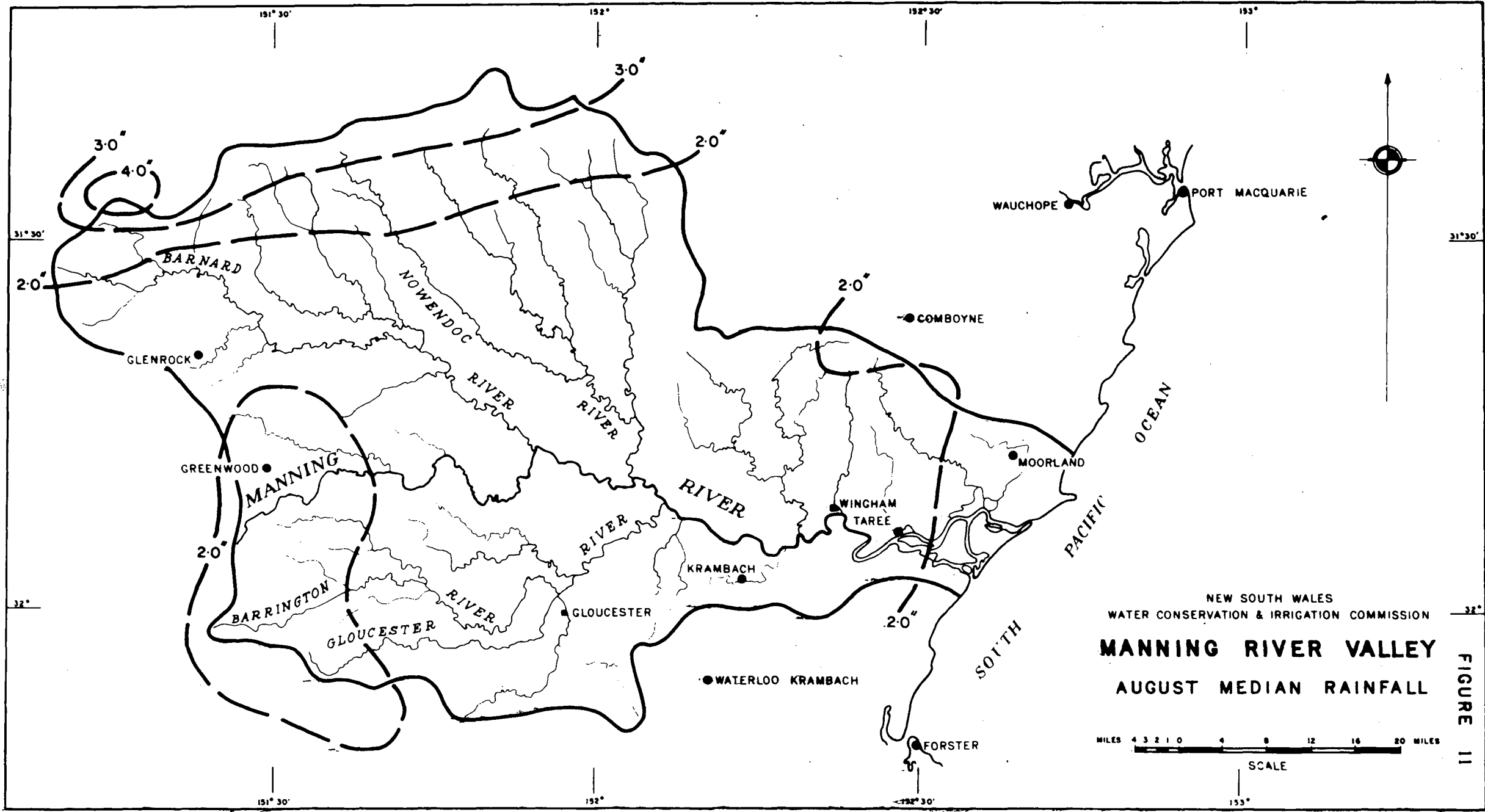
16



NEW SOUTH WALES
 WATER CONSERVATION & IRRIGATION COMMISSION
MANNING RIVER VALLEY
 JULY MEDIAN RAINFALL

MILES 4 3 2 1 0 4 8 12 16 20 MILES
 SCALE

FIGURE 10

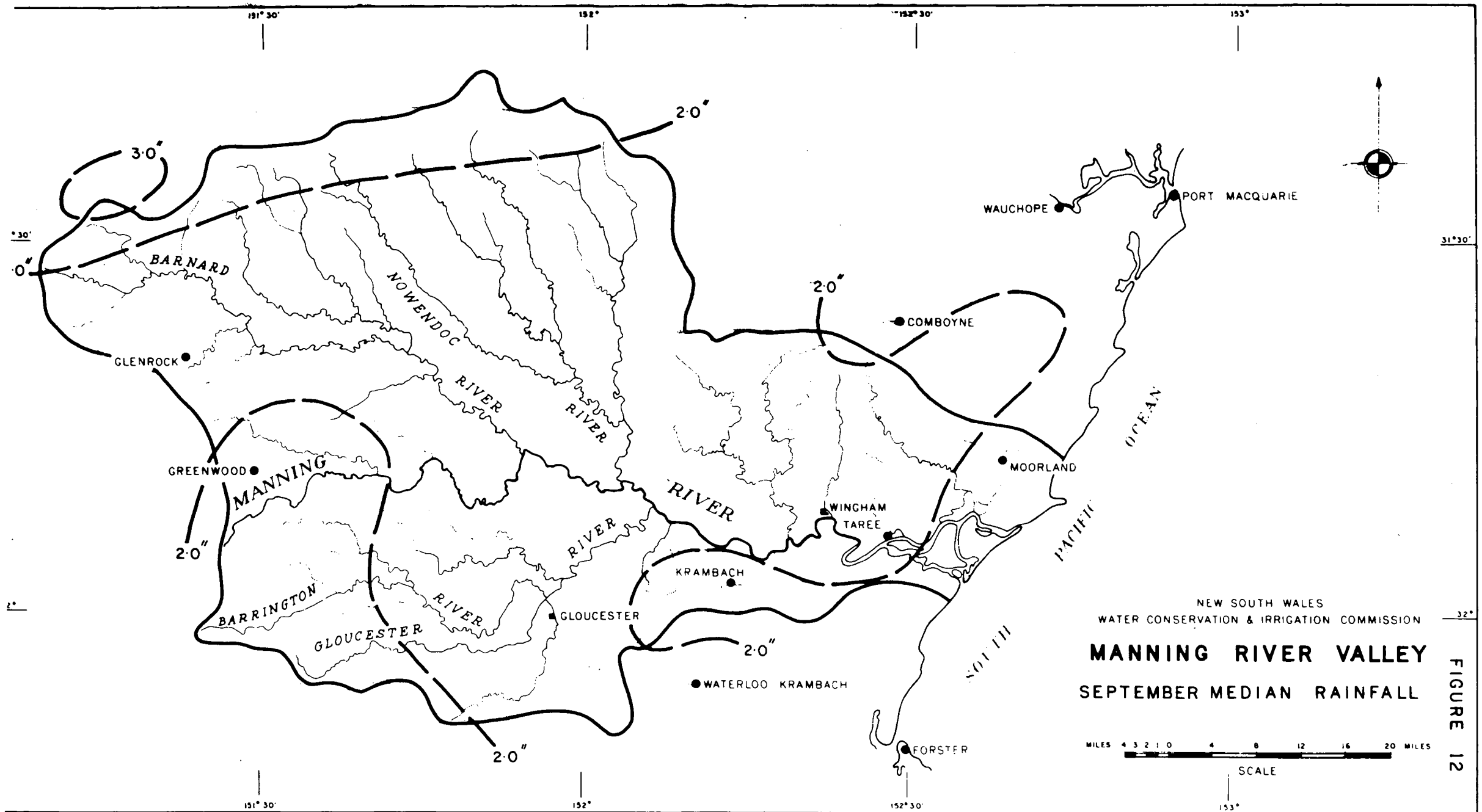


NEW SOUTH WALES
 WATER CONSERVATION & IRRIGATION COMMISSION
MANNING RIVER VALLEY
 AUGUST MEDIAN RAINFALL

MILES 4 3 2 1 0 4 8 12 16 20 MILES
 SCALE

FIGURE 11

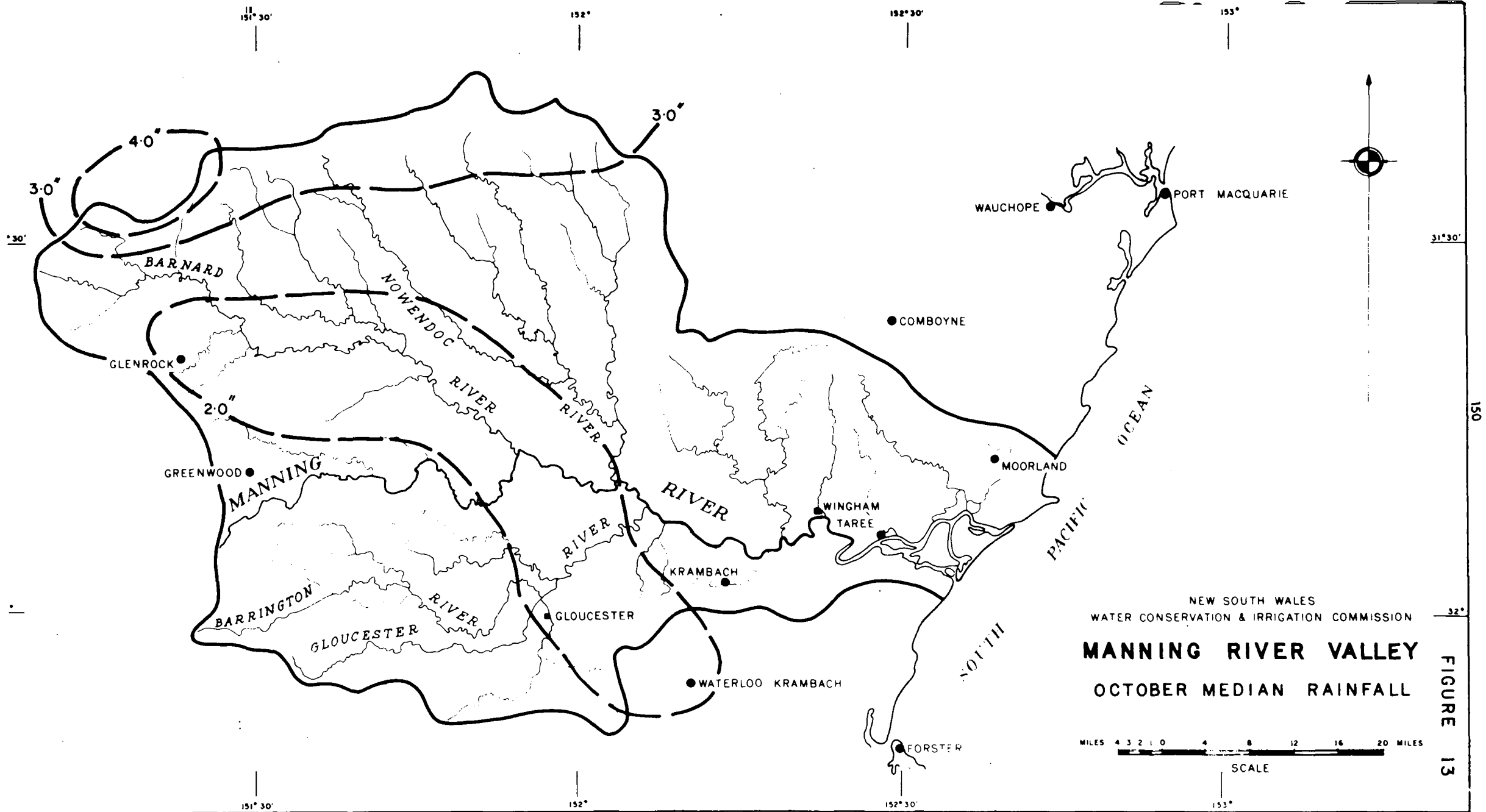
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NEW SOUTH WALES
 WATER CONSERVATION & IRRIGATION COMMISSION
MANNING RIVER VALLEY
 SEPTEMBER MEDIAN RAINFALL



FIGURE 12



NEW SOUTH WALES
 WATER CONSERVATION & IRRIGATION COMMISSION
MANNING RIVER VALLEY
 OCTOBER MEDIAN RAINFALL

FIGURE 13

MILES 4 3 2 1 0 4 8 12 16 20 MILES
 SCALE

150

32°

31°30'

151°30'

152°

152°30'

153°

30'

3.0"

4.0"

3.0"

2.0"

GLENROCK

GREENWOOD

BARRINGTON RIVER

GLOUCESTER RIVER

BARNARD RIVER

NOWENDOC RIVER

RIVER RIVERS

MANNING RIVER

KRAMBACH

GLOUCESTER

WATERLOO KRAMBACH

WINGHAM TAREE

MOORLAND

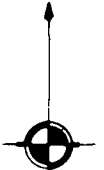
COMBOYNE

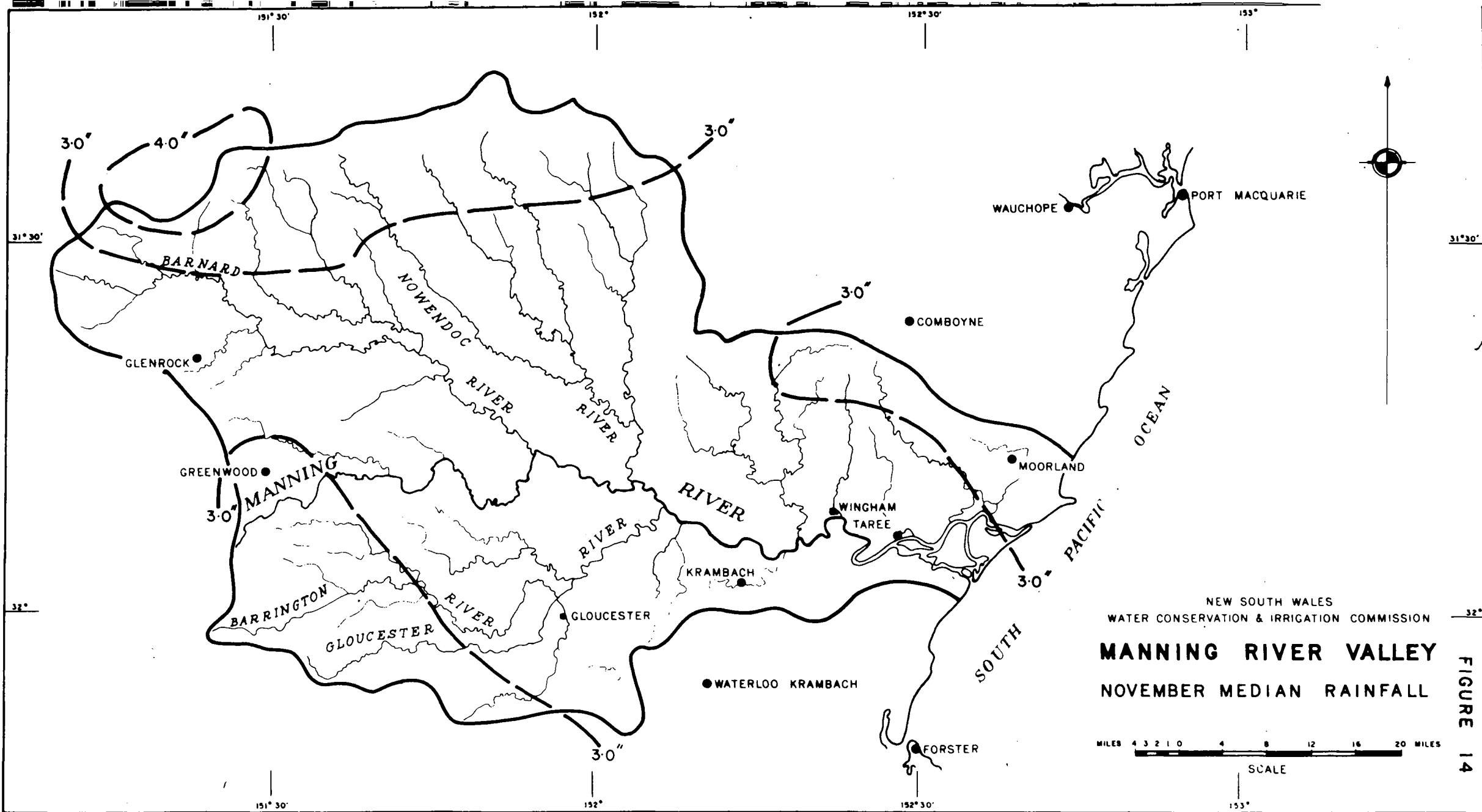
WAUCHOPE

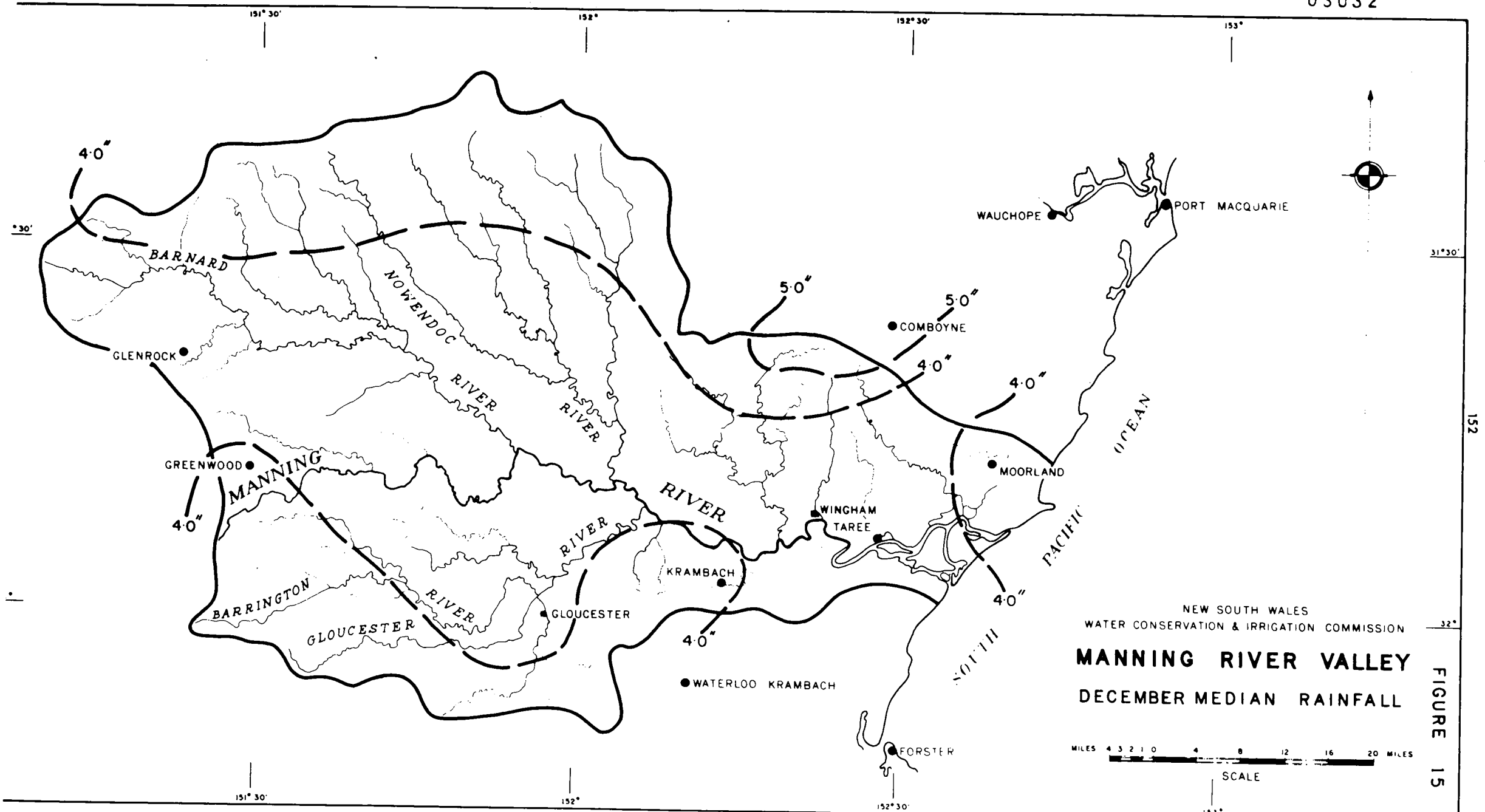
PORT MACQUARIE

SOUTH SEA

PACIFIC OCEAN





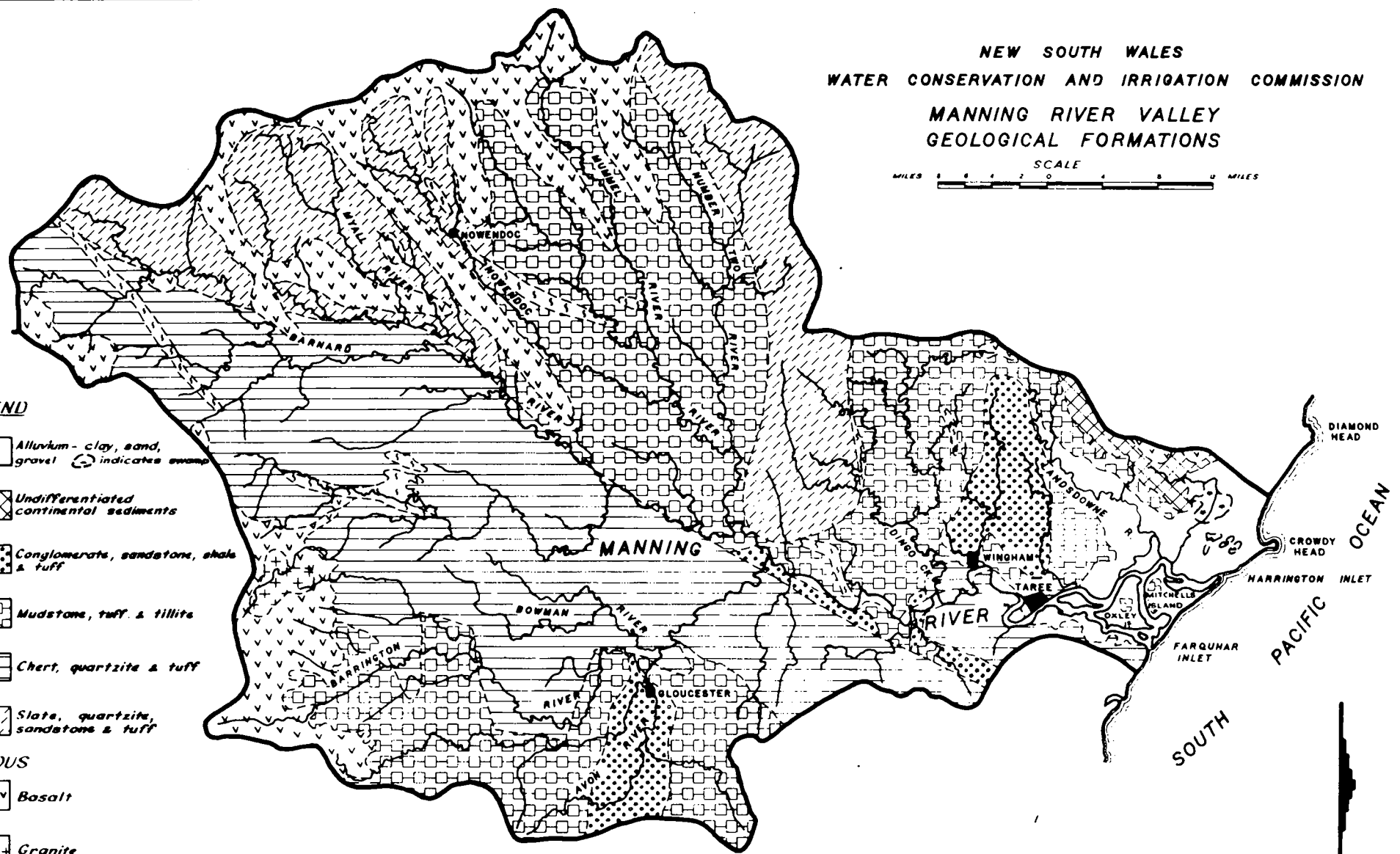


NEW SOUTH WALES
 WATER CONSERVATION & IRRIGATION COMMISSION
MANNING RIVER VALLEY
 DECEMBER MEDIAN RAINFALL

FIGURE 15

MILES 4 3 2 1 0 4 8 12 16 20 MILES
 SCALE

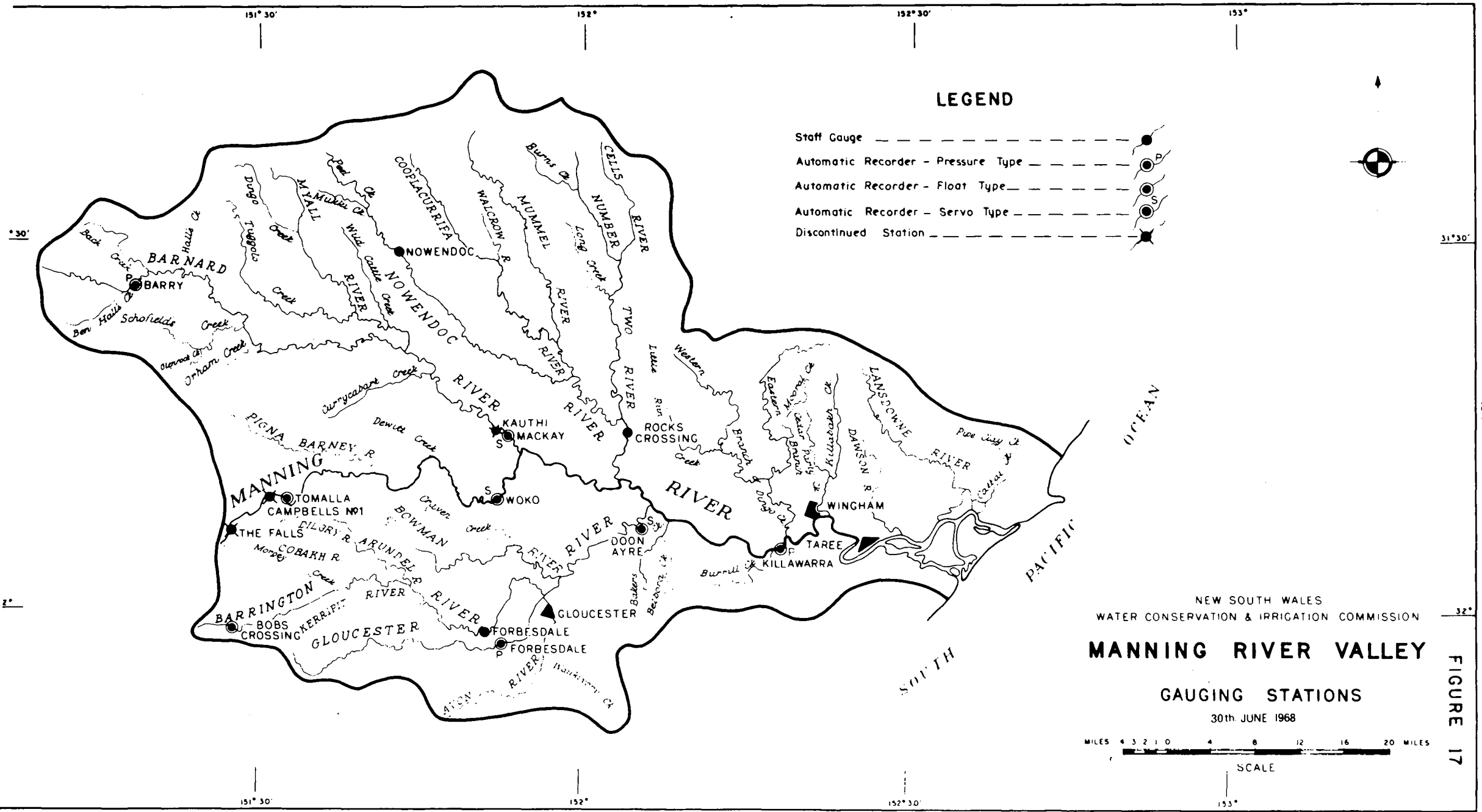
NEW SOUTH WALES
WATER CONSERVATION AND IRRIGATION COMMISSION
MANNING RIVER VALLEY
GEOLOGICAL FORMATIONS



LEGEND

- TERTIARY-RECENT Alluvium - clay, sand, gravel indicates swamp
- TRIASSIC Undifferentiated continental sediments
- PERMIAN Conglomerate, sandstone, shale & tuff
- CARBONIFEROUS Mudstone, tuff & tillite
- DEVONIAN Chert, quartzite & tuff
- SILURIAN Slate, quartzite, sandstone & tuff
- IGNEOUS
 - Basalt
 - Granite
 - Serpentine

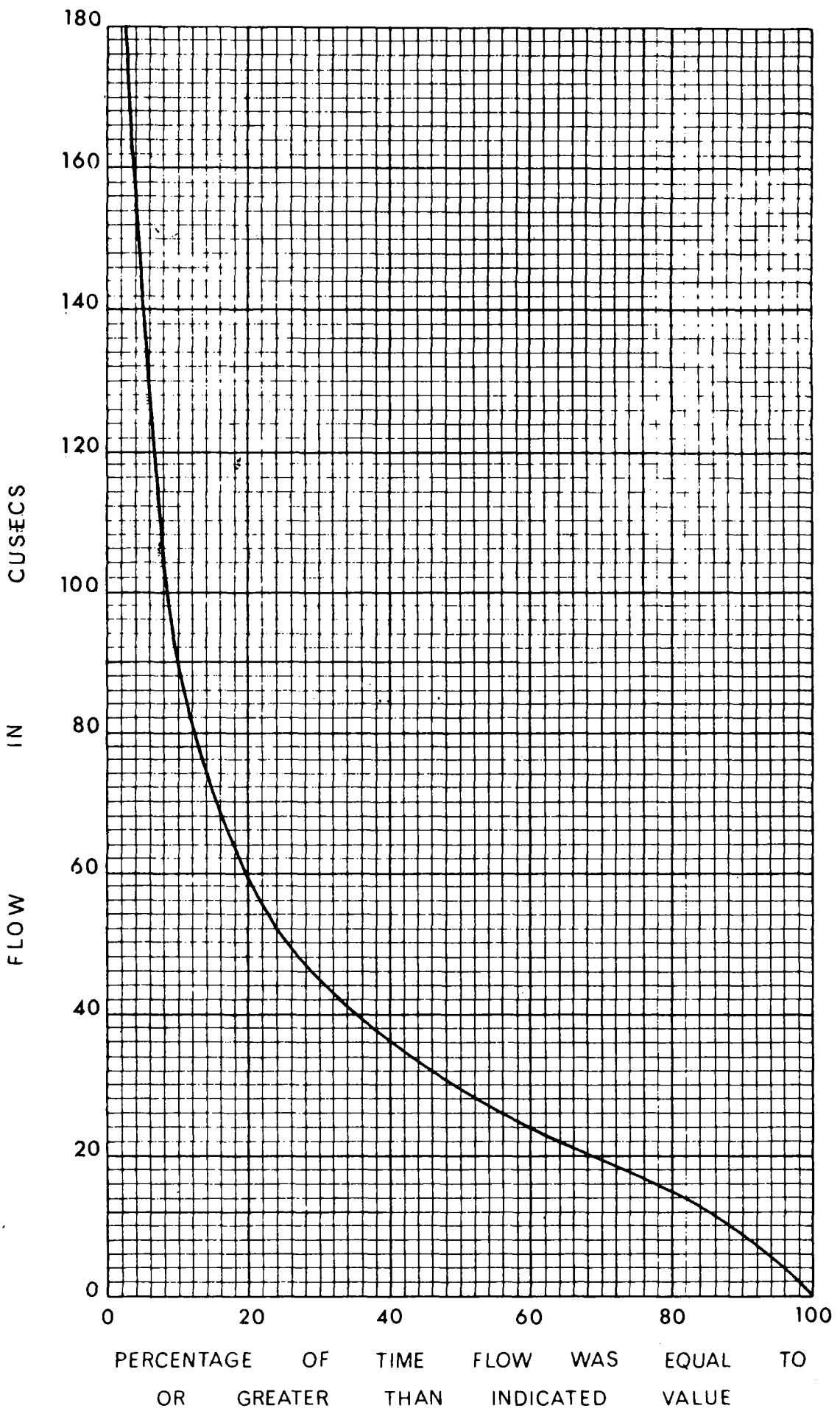
FIGURE 16



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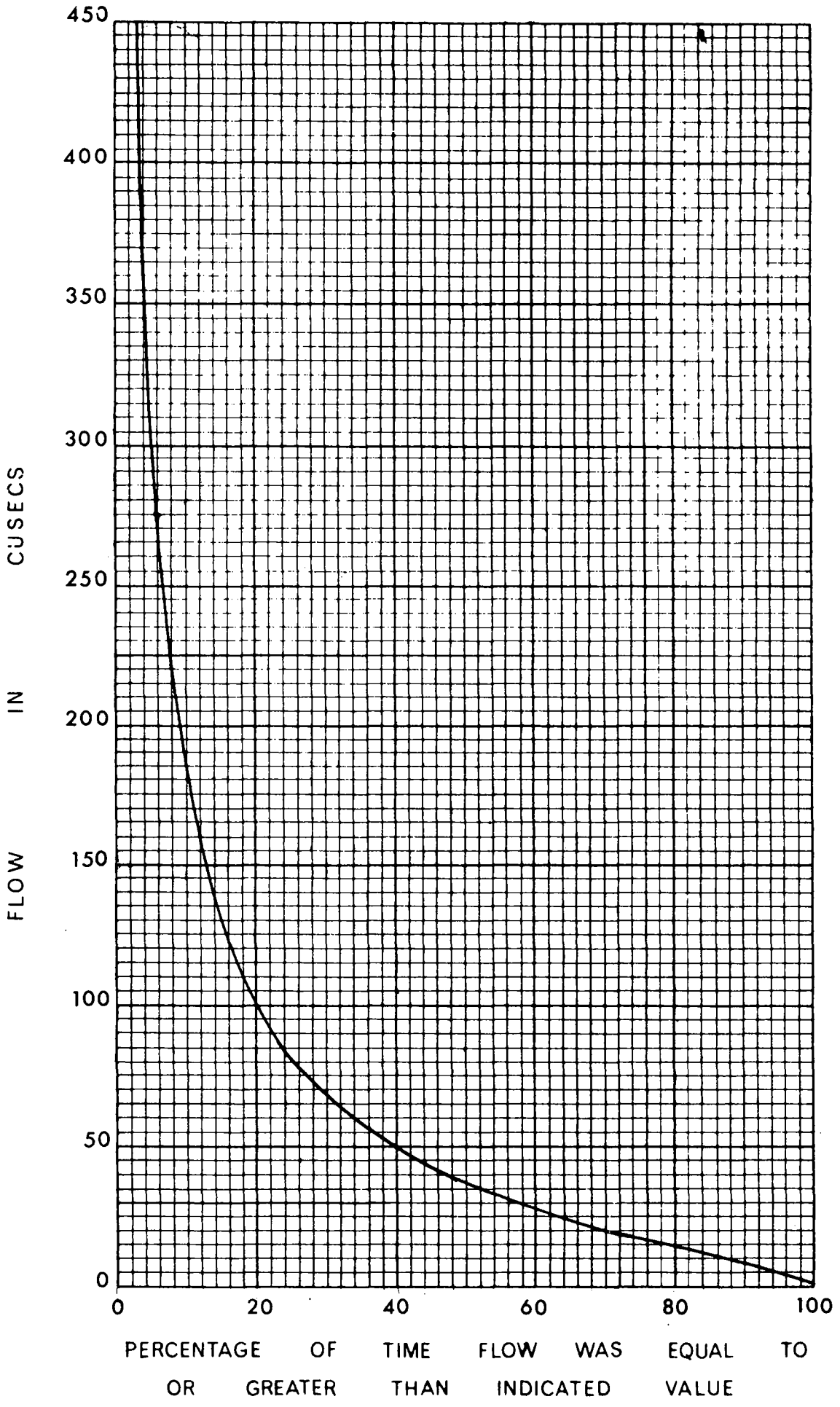
32°

FIGURE 17



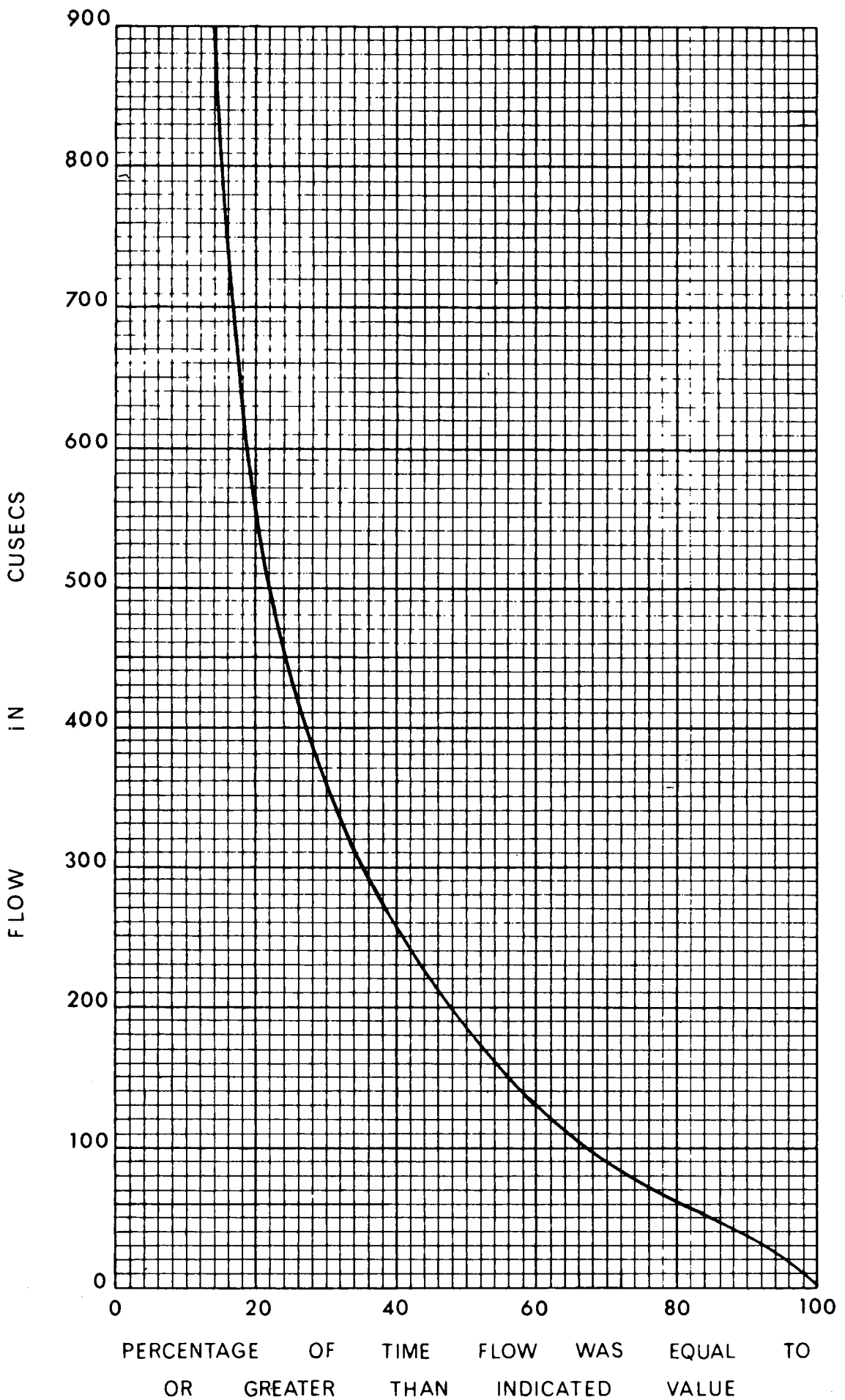
**FLOW DURATION CURVE FOR
MANNING RIVER AT TOMALLA**

FIGURE 21



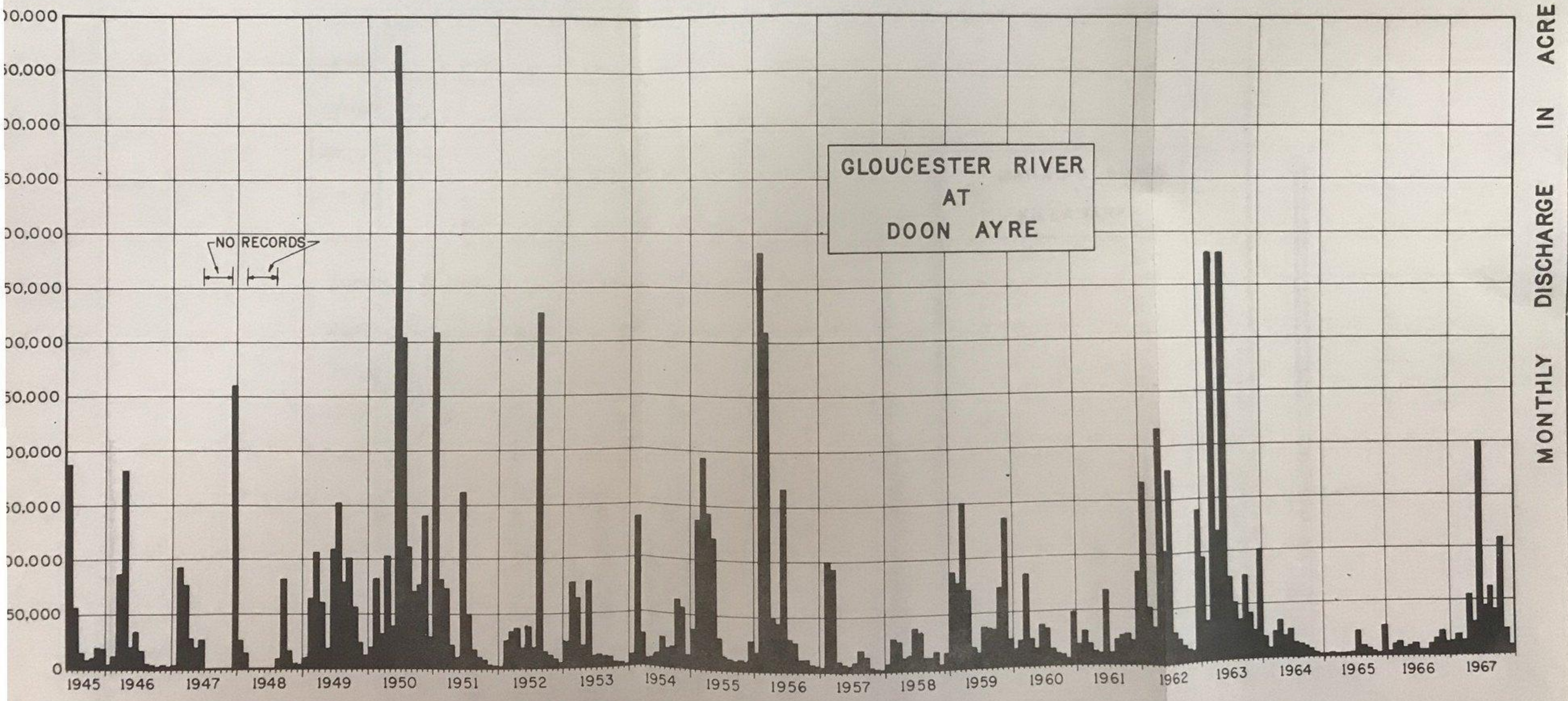
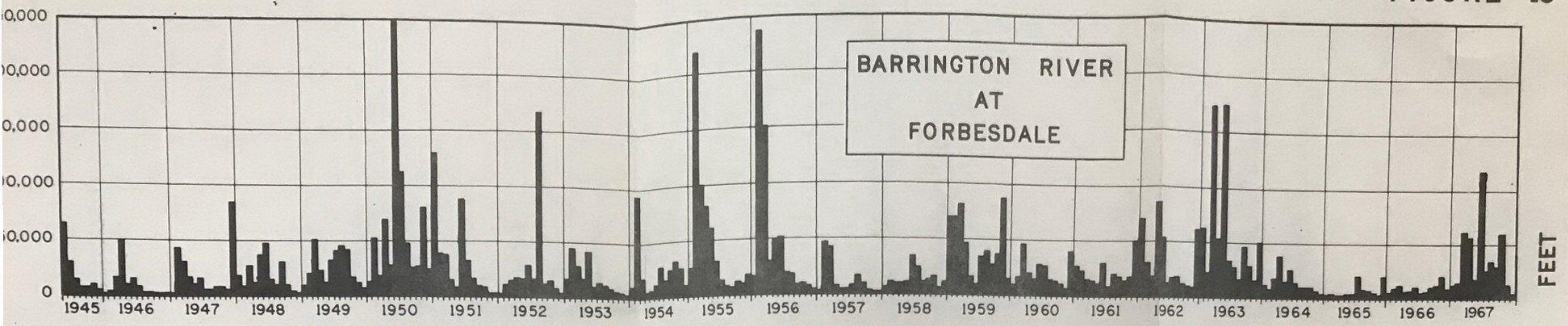
**FLOW DURATION CURVE FOR
NOWENDOC RIVER AT NOWENDOC**

FIGURE 22



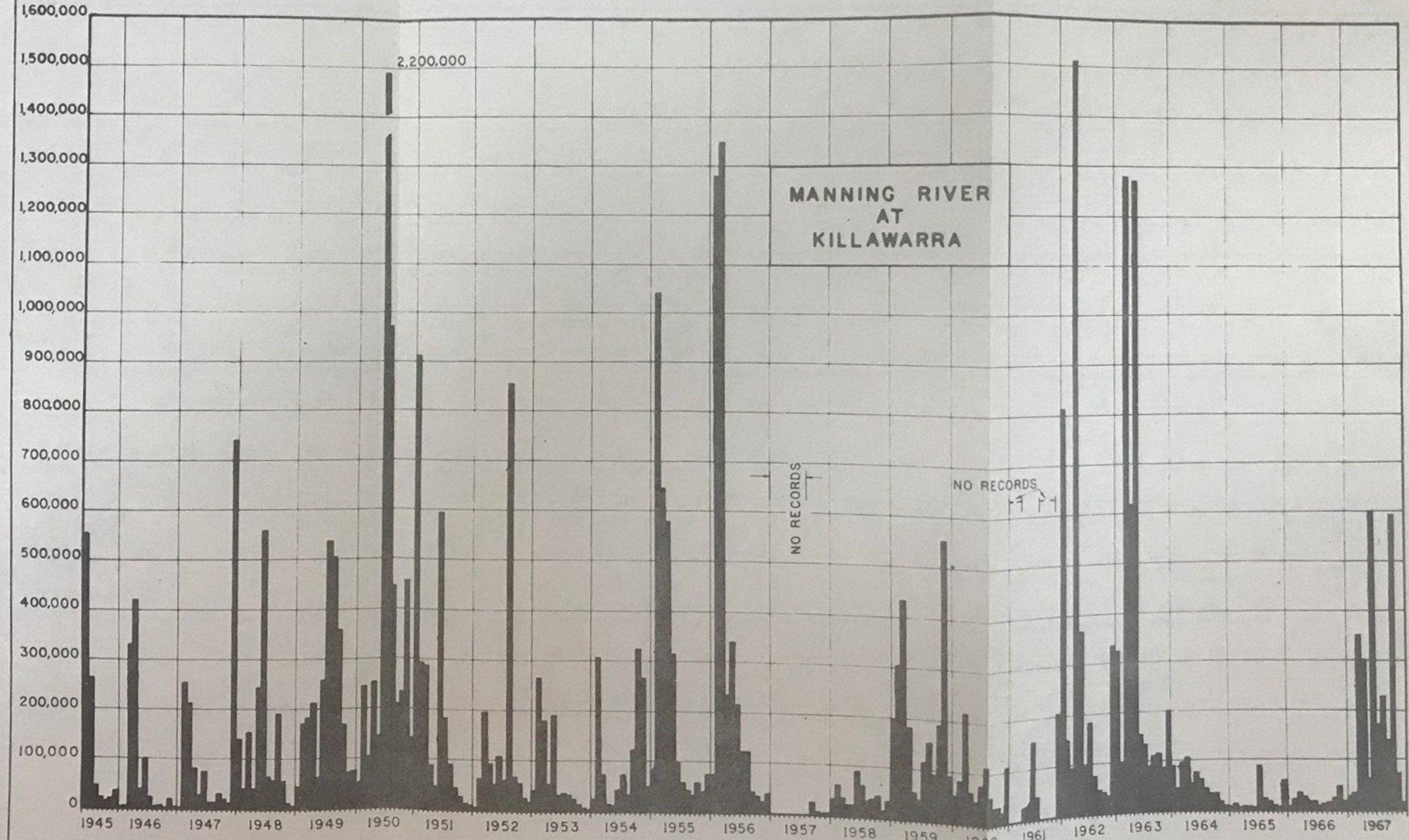
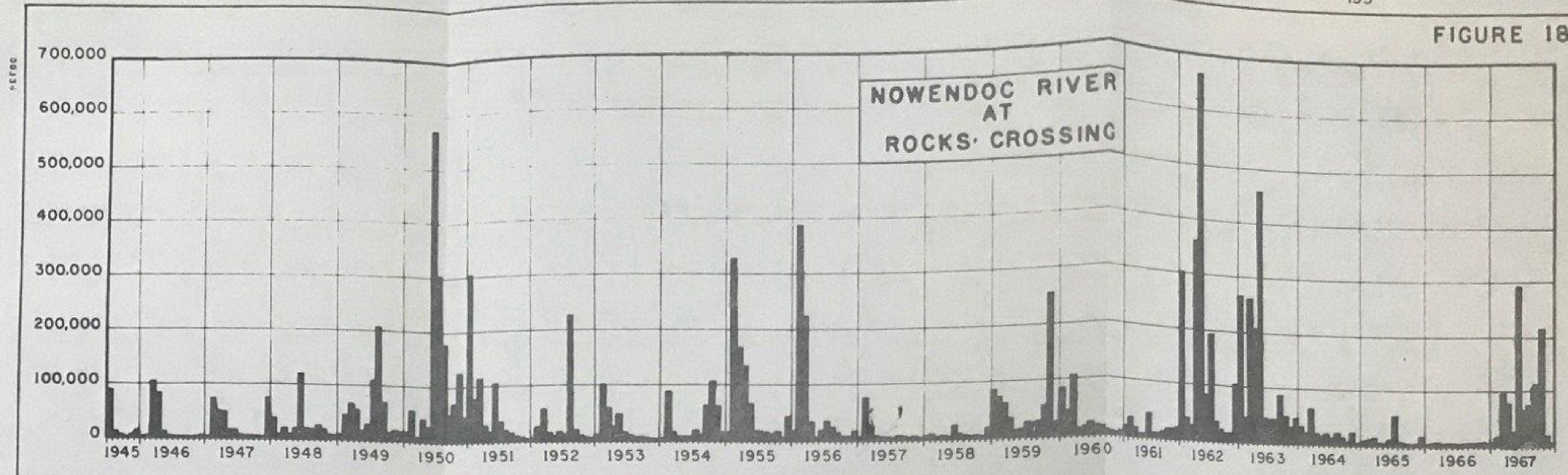
**FLOW DURATION CURVE FOR
NOWENDOC RIVER AT ROCKS CROSSING**

FIGURE 19



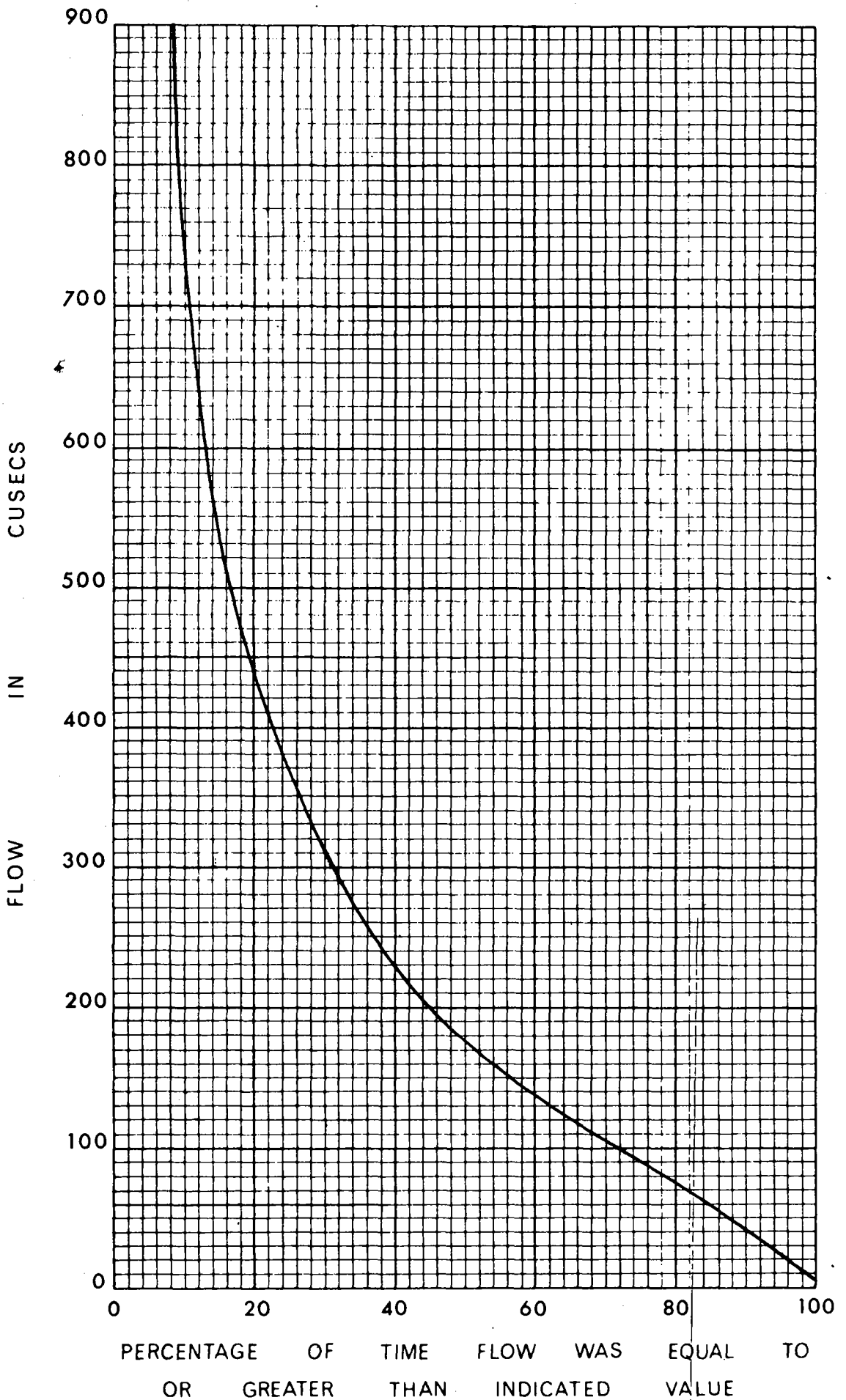
HYDROGRAPHS OF MONTHLY DISCHARGES
 BARRINGTON RIVER AT FORBESDALE AND GLOUCESTER RIVER AT DOON AYRE

FIGURE 18



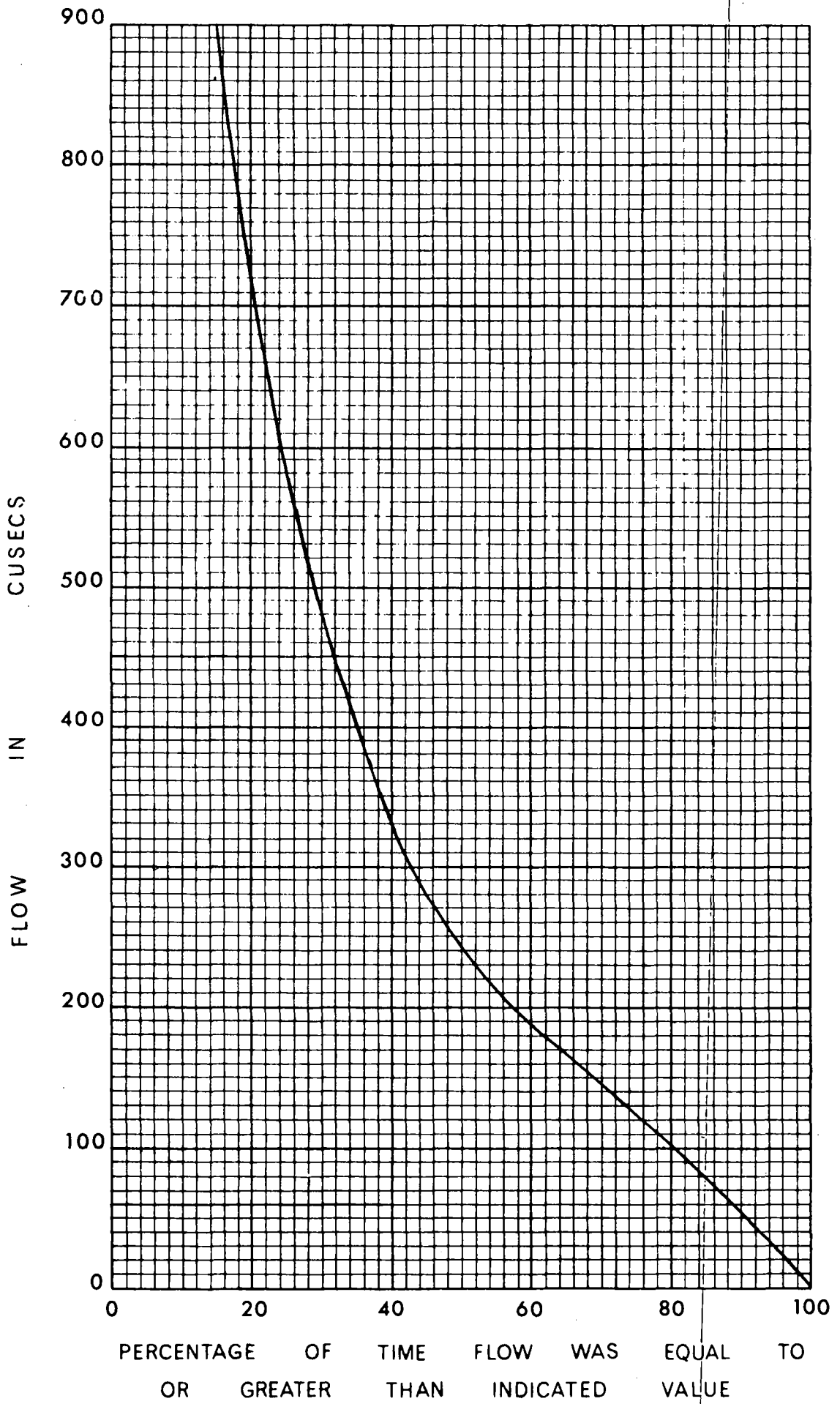
MONTHLY DISCHARGE IN ACRE FEET

HYDROGRAPHS OF MONTHLY DISCHARGE FOR NOWENDOC RIVER AT ROCKS CROSSING AND MANNING RIVER AT KILLAWARRA



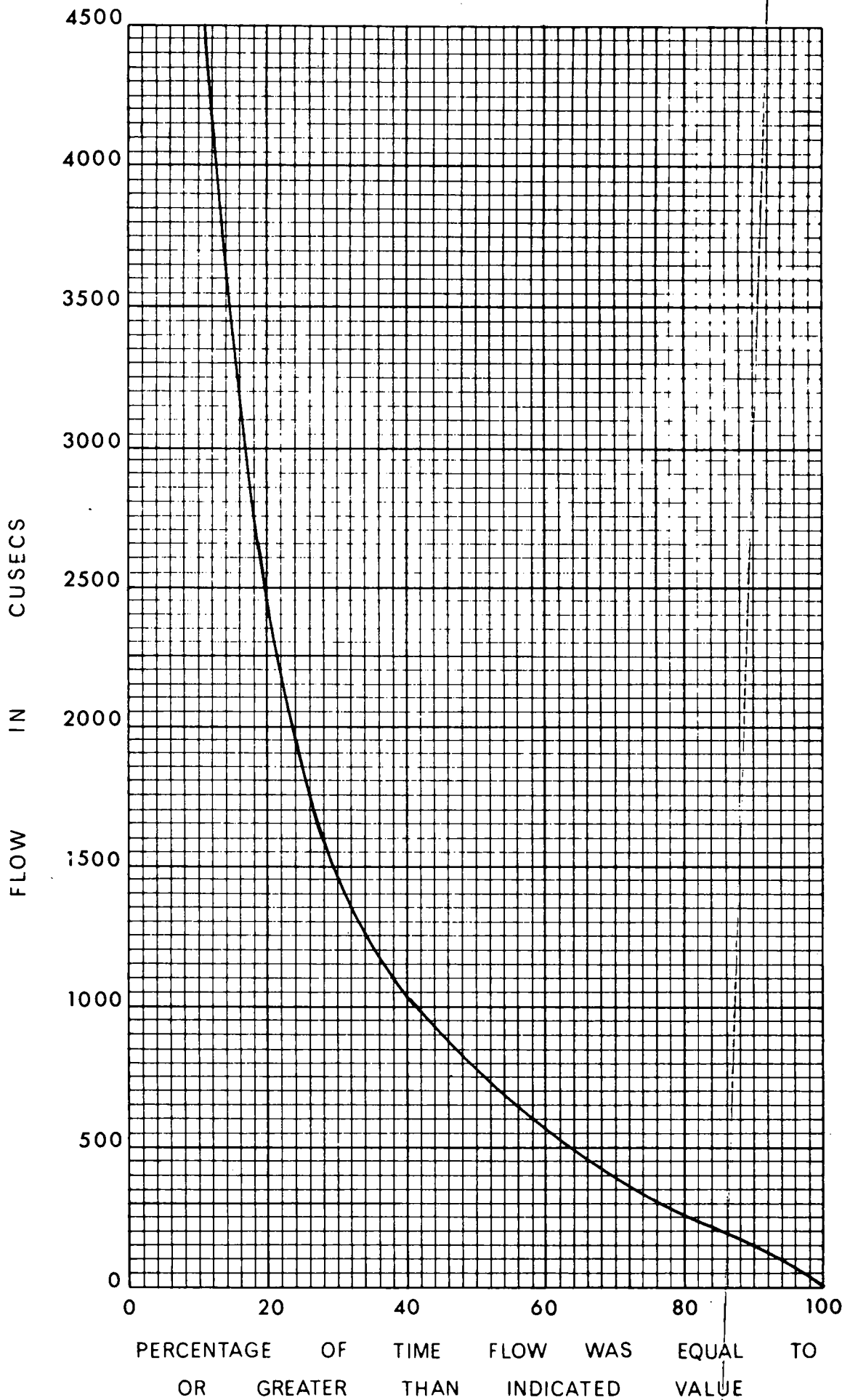
**FLOW DURATION CURVE FOR
BARRINGTON RIVER AT FORBESDALE**

03038



**FLOW DURATION CURVE FOR
GLOUCESTER RIVER AT DOON AYRE**

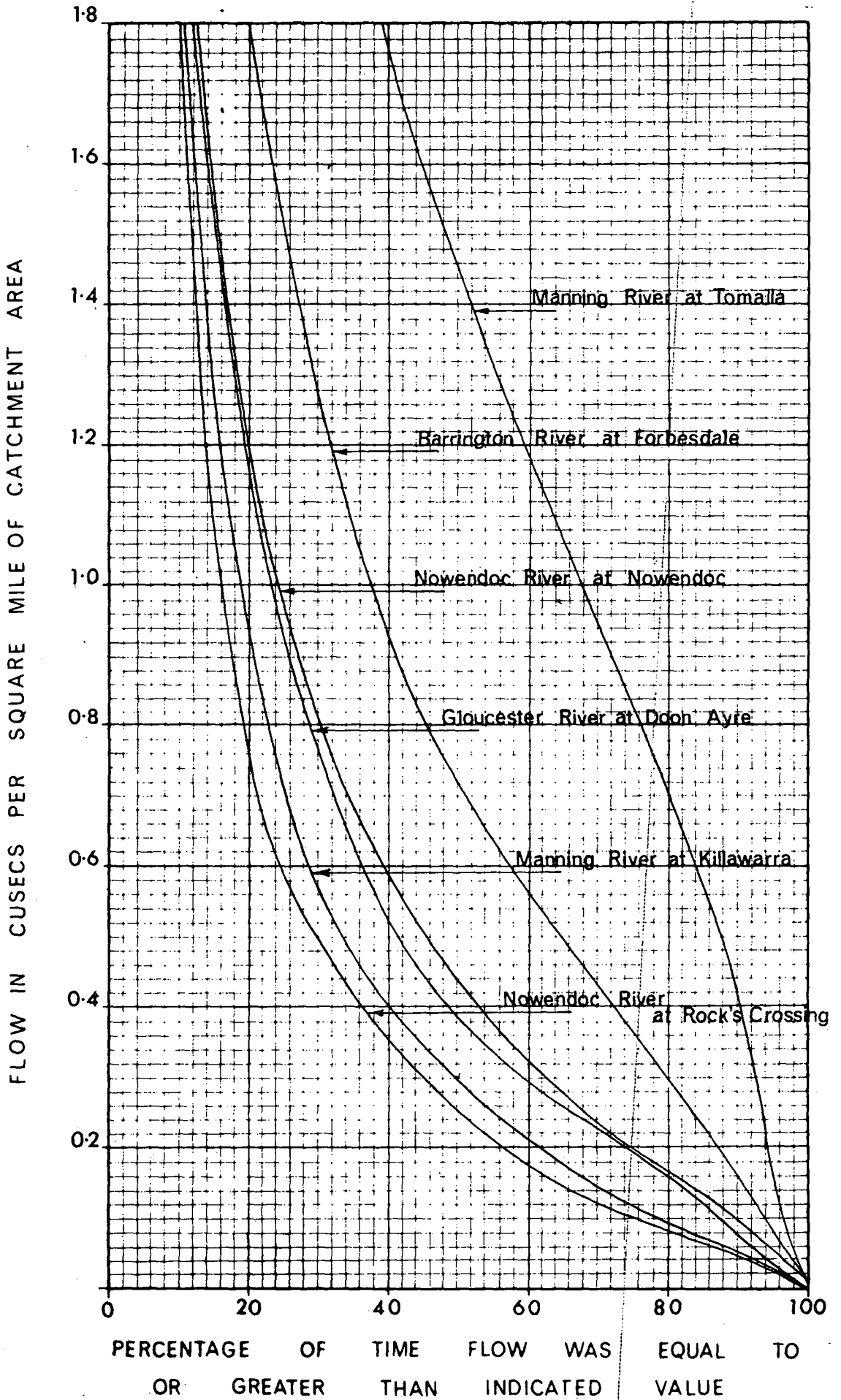
FIGURE 25



**FLOW DURATION CURVE FOR
MANNING RIVER AT KILLAWARRA**

FIGURE 26

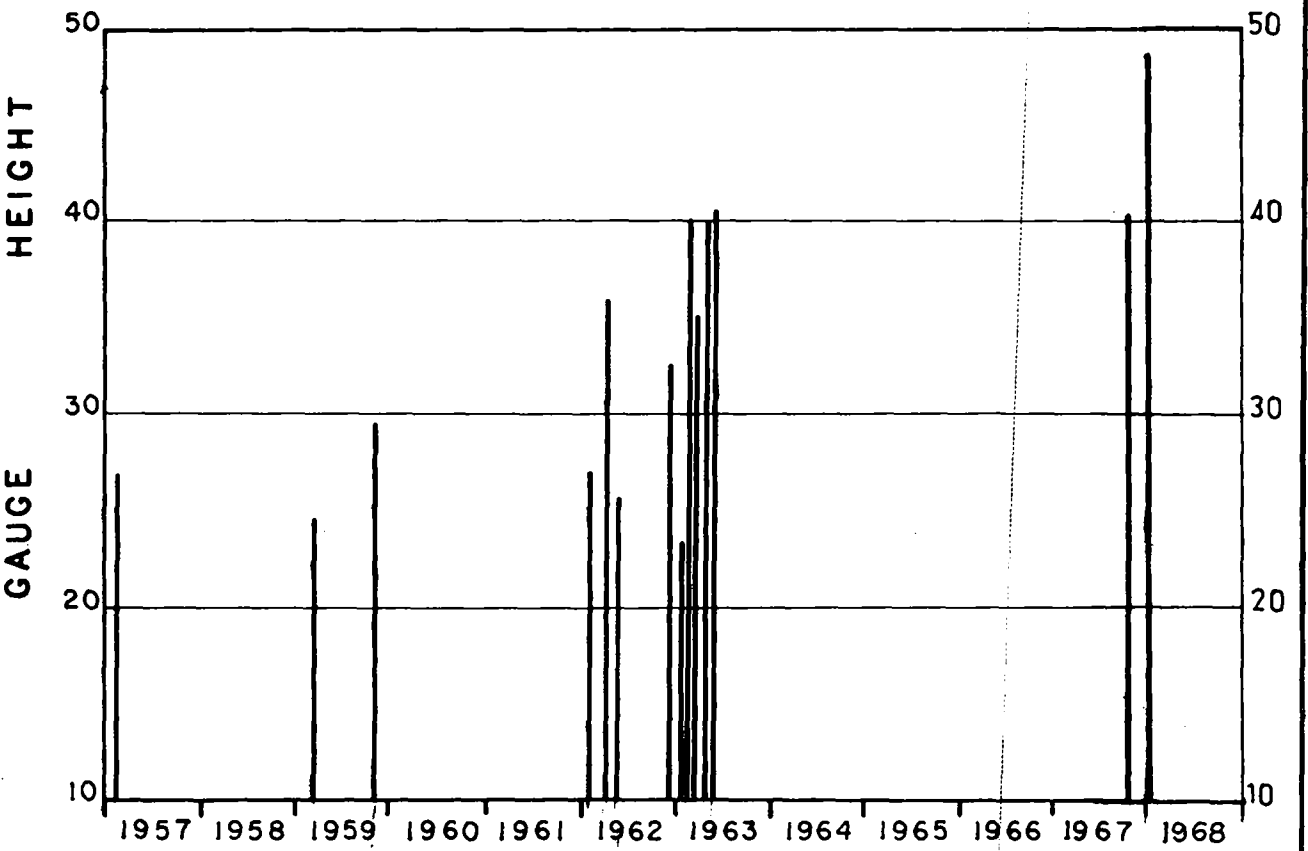
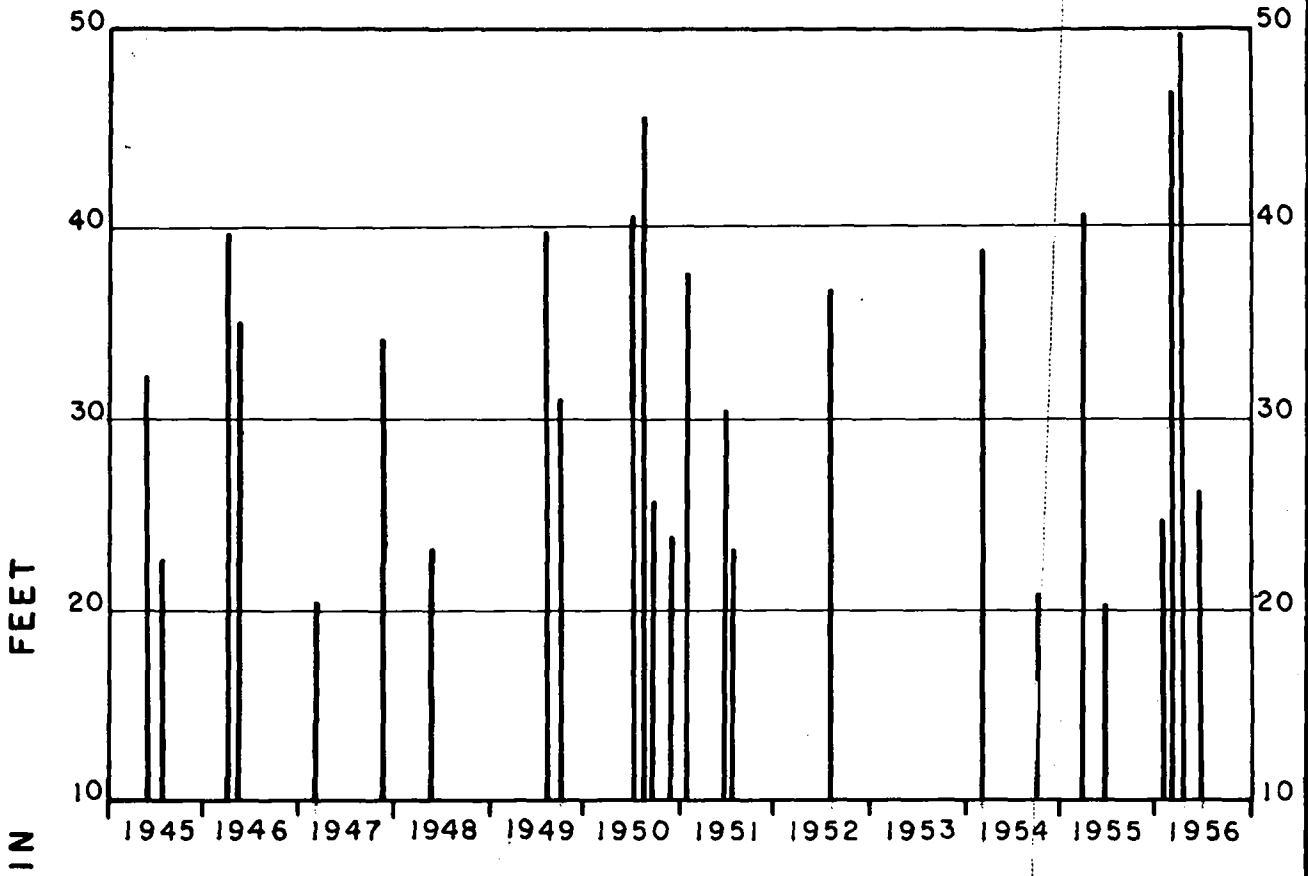
03041



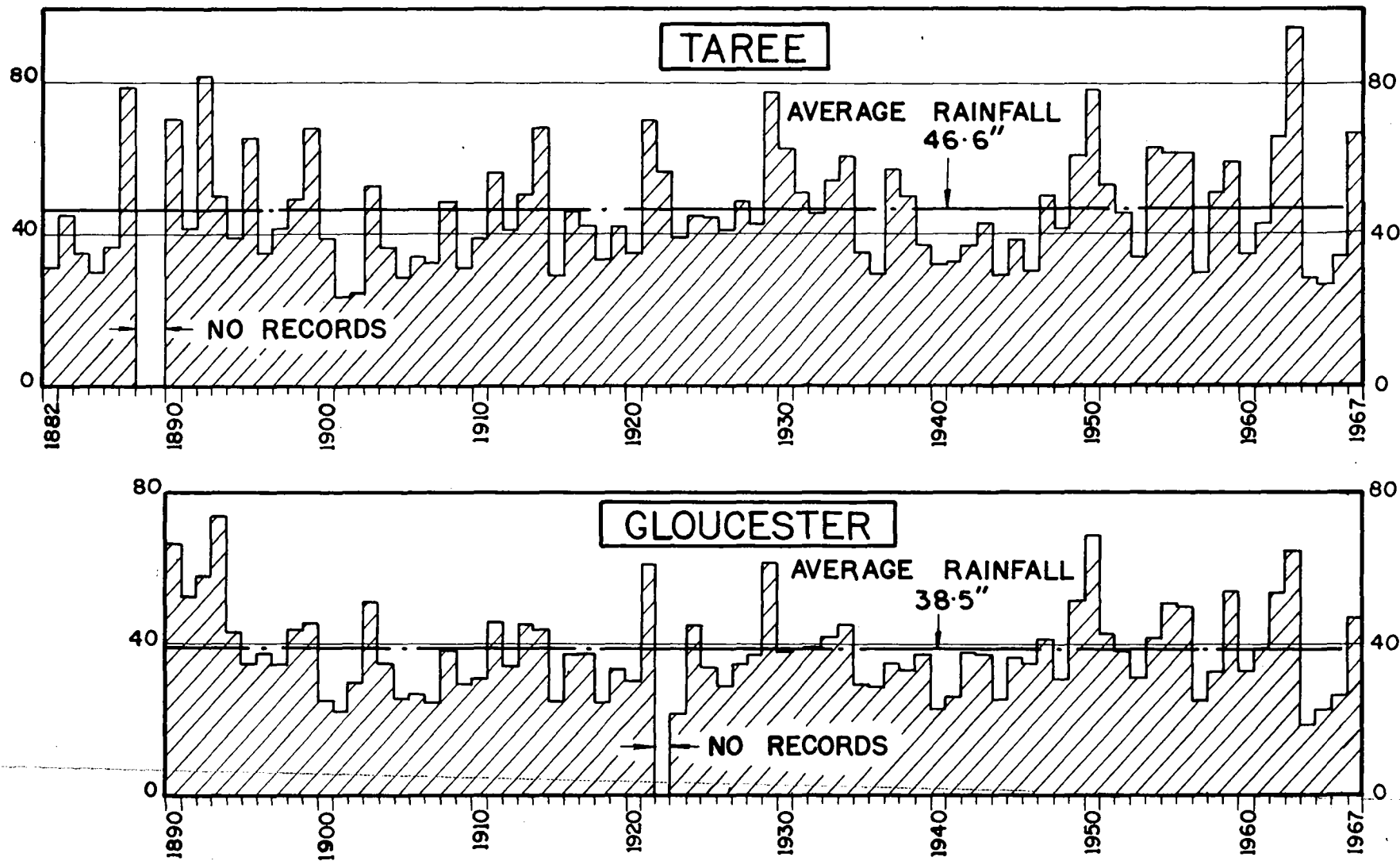
FLOW DURATION CURVES FOR MANNING RIVER VALLEY

FIGURE 27

03042



RECORDED GAUGE HEIGHTS
 GREATER THAN 20 FEET
 MANNING RIVER AT KILLAWARRA

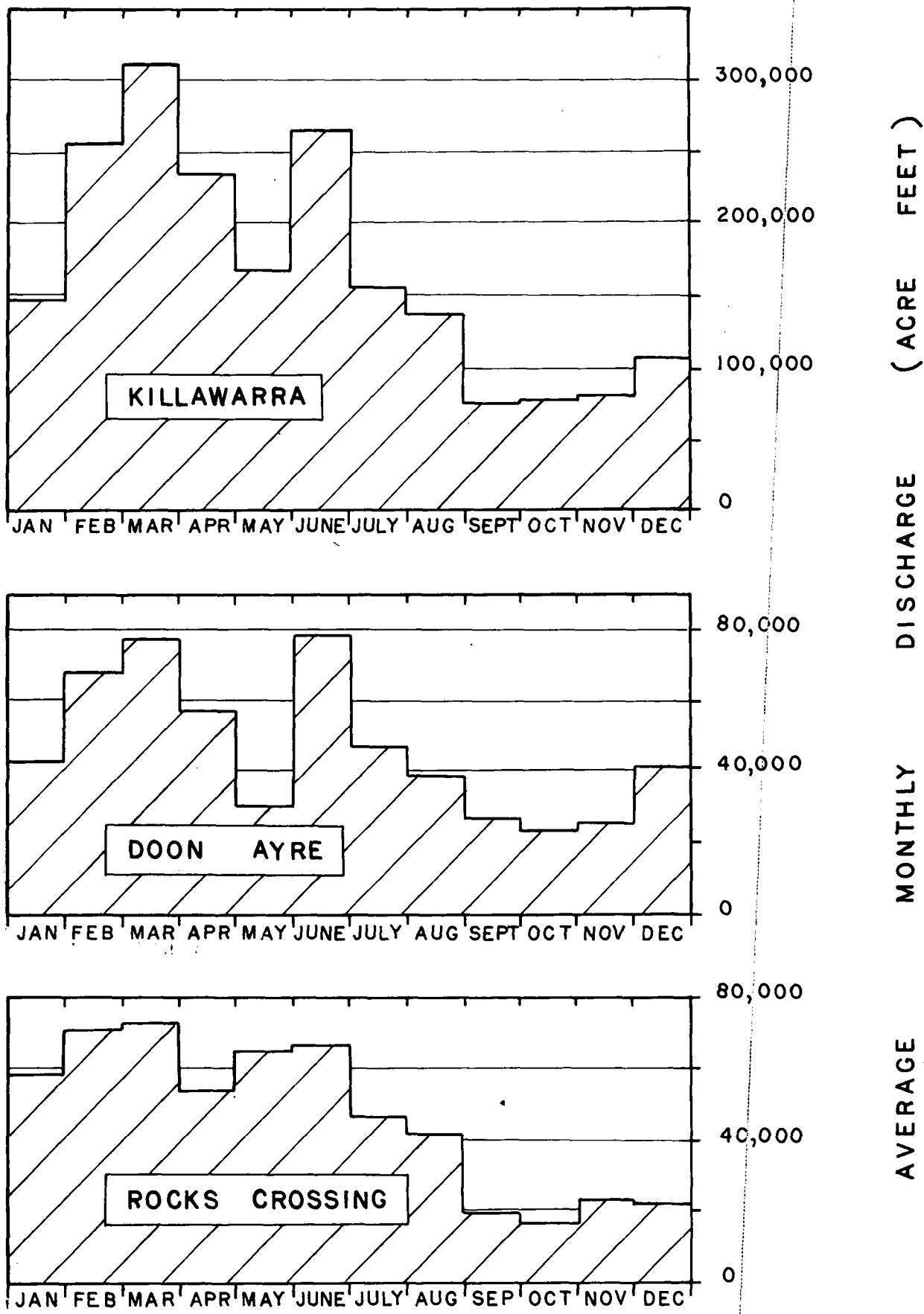


ANNUAL RAINFALLS AT TAREE AND GLOUCESTER

ANNUAL RAINFALL IN INCHES

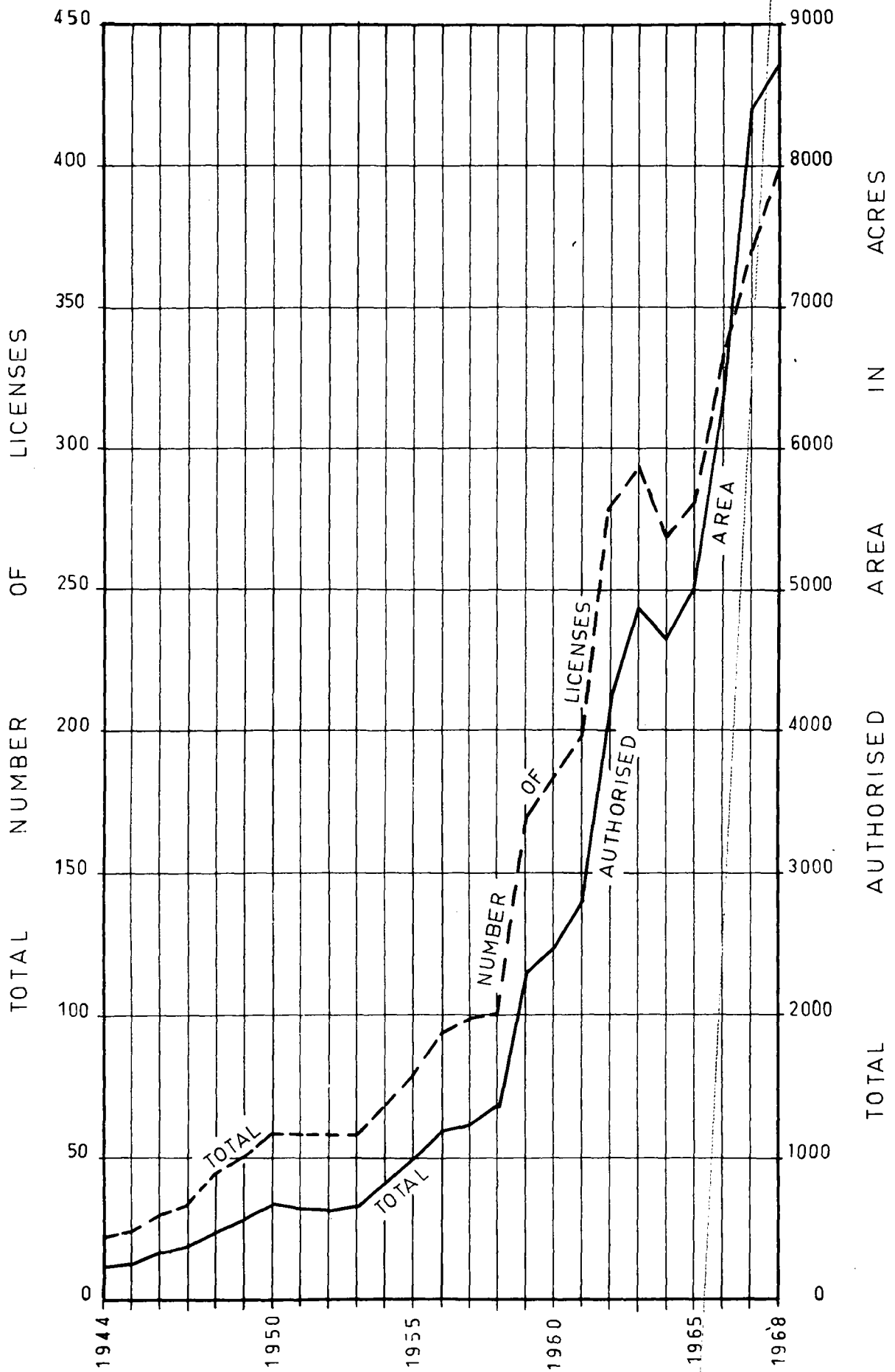
FIGURE 28

FIGURE 29



AVERAGE MONTHLY DISCHARGES
 FOR
 MANNING RIVER AT KILLAWARRA
 GLOUCESTER RIVER AT DOON AYRE
 AND
 NOWENDOC RIVER AT ROCKS CROSSING

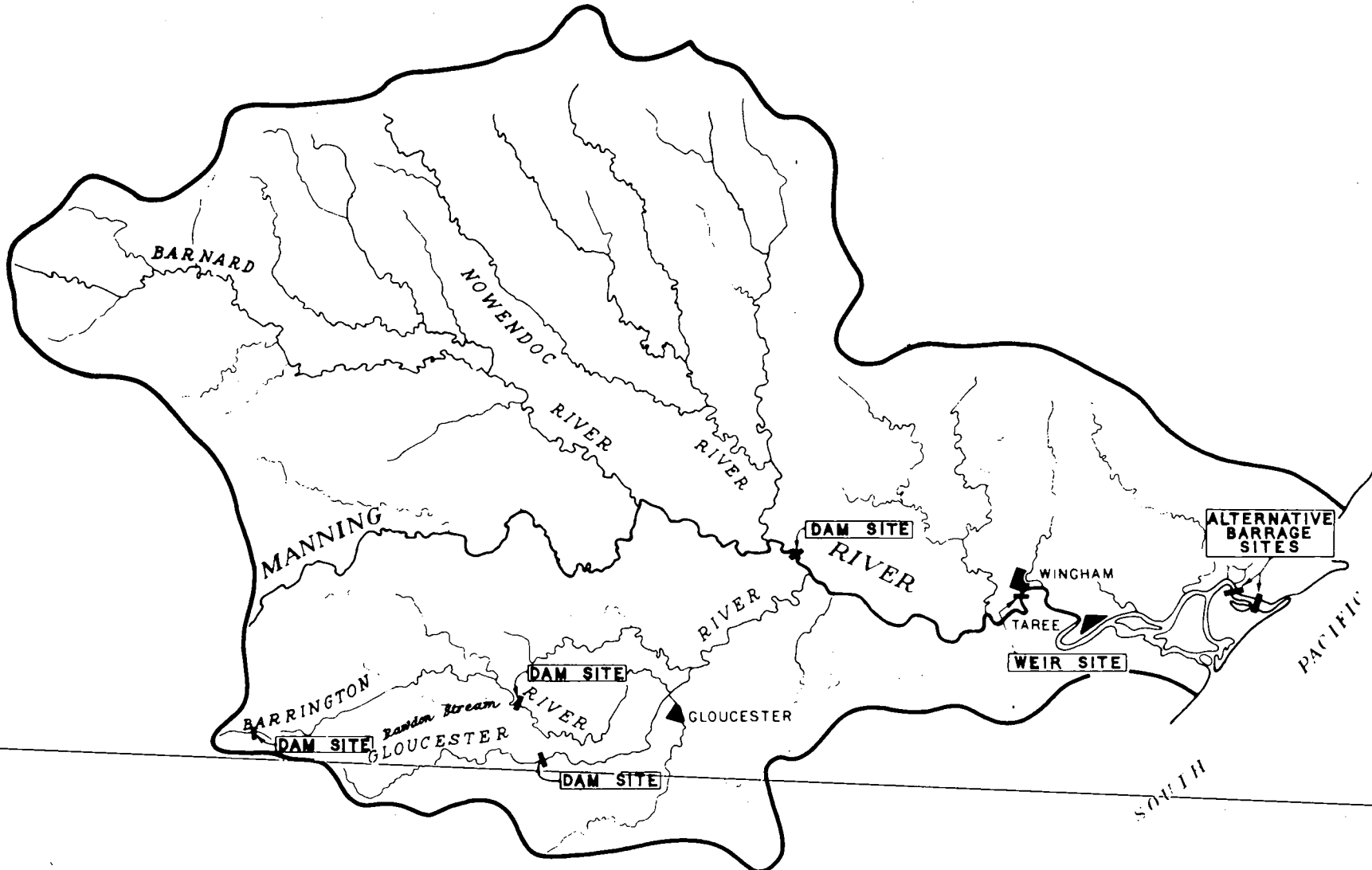
FIGURE 30



MANNING RIVER VALLEY
 AREA AUTHORISED FOR IRRIGATION AND
 TOTAL NUMBER OF LICENSES AT 30th JUNE
 FOR EACH YEAR INDICATED

31° 30'

31° 30'



32°

32°

151° 30'

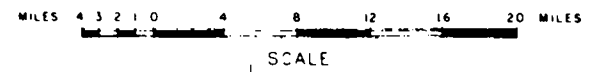
152°

152° 30'

153°

NEW SOUTH WALES
WATER CONSERVATION & IRRIGATION COMMISSION

MANNING RIVER VALLEY WATER CONSERVATION STORAGE SITES



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FIGURE 31