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Johannesburg's sphere of influence

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tion Area, that is Zone I. Zone II consisting of Pretoria, the Western Transvaal, the Northern Free State and the Natal Coast, was responsible for 26% of the sales. Zone III was made up of the Northern Transvaal and Natal County, the latter linking the Natal Coast and Northern Free State, that is Zone II. Zone IV formed the outlying areas thereby fringing on the more important regions of distribution.

It was surprising that the Natal Coast was so important, since it was here that the only other Sunday newspaper was found. Its significance was just as great as that of Pretoria. This was mainly due to the large number of English newspapers sold in the Natal Coast, the main urban centre being Durban, despite the presence of a local English newspaper on Sundays.

Although not mapped, the relative importance of English and Afrikaans newspaper distribution in the circulation regions may be assessed from TABLE 13. Throughout Natal and in the more urbanized circulation areas, even if just one large urban centre was present, English newspaper sales were greater than their Afrikaans counterpart. In rural areas the difference between English majority and Afrikaans minority was less, such as in the Southern Free State. In the Northern Free State and the Transvaal north of Pretoria Afrikaans newspapers were more important. The importance of circulation area was thus influenced to a greater or lesser extent by either English or Afrikaans newspapers, the greatest differences and, therefore, influences were recorded in Natal which is very much more English orientated than the majority of areas in South Africa.

(c) Magazines: Although Johannesburg is an important producer of magazines, they are considered of little value in delimiting its sphere of influence because of their national and specialised characteristics. From data available, it appears that about 30% to 35% of the magazines are sold in the Witwatersrand and Pretoria areas combined.

TABLE 13: Comparison of English and Afrikaans Newspaper (Sunday) Distribution 1962-63[1].

Circulation Breakdown Areas	Number of English Copies+	Number of Afrikaans Copies+	English +or - Afrikaans.
Witwatersrand	268,000	123,000	+ 2.18
Natal Coast	67,000	5,500	+12.18
Pretoria	38,000	24,500	+ 1.58
Western Transvaal	16,000	11,000	+ 1.45
Northern Free State	17,000	22,500	- 1.32
Natal County	17,000	3,000	+ 5.67
Lowveld	6,000	4,000	+ 1.50
Waterberg	4,500	8,000	- 1.78
Central Transvaal	3,500	4,000	- 1.14
Highveld	9,000	10,000	- 1.11
Griqualand West	6,500	[illegible].500	+ 2.43
Zululand	1,500	1,000	+ 1.50
Southern Free State	11,500	11,000	+ 1.04
Far Northern Cape	2,500	2,500	-

+ Number of copies to nearest 500.

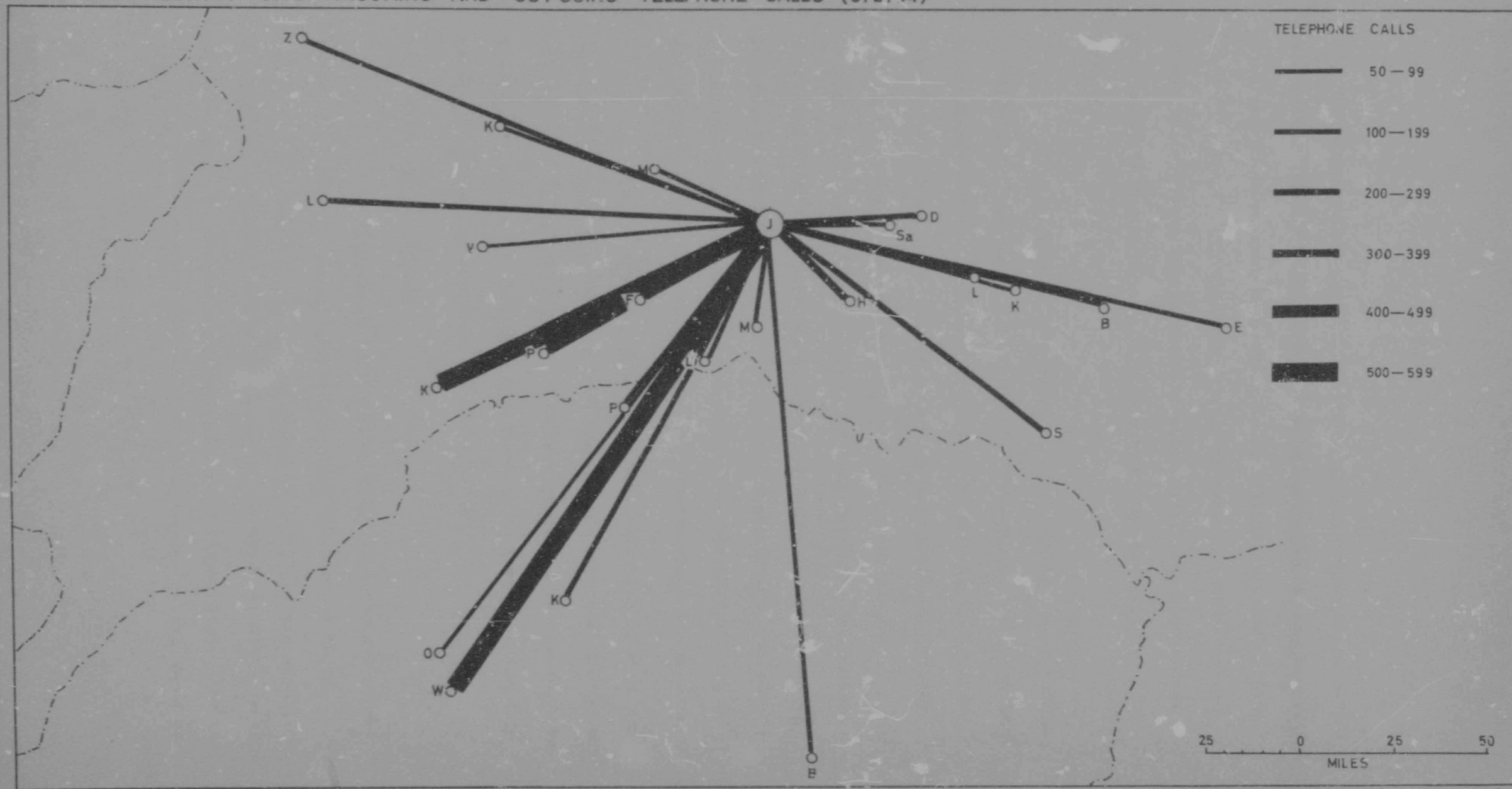
2. Telephones.

In gauging the central importance of a city, Christaller used an "index based on number of telephones in proportion to the average number per thousand inhabitants in South Germany, weighted further by the telephone density of the local subregion..... He claims that telephones, since they are used for business, are a reliable index of centrality (Ullman 1941 p857). Ullman points out that since telephones are common to homes in the U.S.A., the above theory is not valid and points out that the number of out-of-town calls is a better measure of centrality (Ullman 1941 p857). Green follows this line of investigation and claims that long-distance telephone calls are as valid a measure of metropolitan influence as are newspapers, and have three advantages over newspaper circulation:

.../(1)

1. Compiled from data given in the Net Sales Certificates of the Audit Bureau of Circulation.

FIG.9 : JOHANNESBURG - DAILY INCOMING AND OUT-GOING TELEPHONE CALLS (3/2/64)



P.S.K

"(1) Most newspapers make little attempt to push circulation beyond the trading area of their advertisers, whereas people make necessary telephone calls without consideration of trading area boundaries; (2) The telephone time-distance factor is reduced because calls cover great distances with little elapsed time; (3) There is no problem of differences in quality affecting comparability". (H.L. Green 1955 p290).

Investigating the use of telephone calls as a criterion in delimiting Johannesburg's sphere of influence, it was found that data were not readily available but had to be extracted from the official returns of the various exchanges throughout the country and proved to be a time-consuming task. Even then the data was not of much value since Johannesburg has direct telephone connections with several of the large towns, and vice versa. Automatic meters register the number of calls, but not the destinations. In the future even less data will be available since the introduction of the direct services is progressing rapidly throughout the country.

FIG. 9, however, does give some indication of what can be expected by extracting data from the returns mentioned above, but for the data to be of real significance a quantitative base must be introduced, unless the boundary delimited is an isopleth, say, 50% isopleth between Johannesburg and Bloemfontein.

3. Retail Trade.

"Influence of a central place is expressed in the utilisation of the central activities which are located there. Every central activity has its own field of influence and also its own umland .... Retail trade forms one of the most important central activities in the field of influence in any built-up area. Its influence is materialised in visits to and purchases in the shops of the central place " (Bengtsson - 1960 p297).

.../"People

"People are free to buy wherever they please, but where people go to buy various things actually falls into a definite pattern. This pattern is based on differences in goods and differences in distances, time, cost, and effort to reach stores that sell the desired goods. Some purchases are considered more important than others " (Converse 1958 p28). There are two broad classifications of goods: shopping and convenience.

Shopping Goods: "People will devote more time and attention - that it, shop around more - for articles that absorb a substantial portion of the family income, as automobiles or refrigerators .... They are more anxious to get exactly the 'wanted' thing when seeking items of personal apparel or items that give prestige, ... they want to compare quality, type, appearance, and price in several stores" (Converse - 1958 p28). Shopping goods are of two kinds. Firstly, service or impulse goods which include durable or luxury articles. Here the quality is not easily determined by the consumer but the reputation of the maker is important. Secondly, fashion or demand goods - goods needed over a period - are different since price, reputation of the maker and repair service of the local dealer are of prime importance.

In buying fashion goods several stores are visited. These stores must, therefore, be in close proximity, that is, in the C.B.D. or in large outlying shopping districts, and normally not found in neighbourhood locations, although goods of this nature may be stocked by some general stores.

Convenience Goods: People prefer to buy convenience goods - small articles bought frequently and daily needs - at convenient places. They prefer places near their homes, places of employment or places easily reached by car. Low prices and large assortments are important when selecting places for buying convenience goods.

.../Vance

Vance (1960) applying Lösch's concept of equilibrium of location notes that "retail establishments are divided into.... the speciality shop in the core area necessarily dependant on the entire metropolitan market, and the mass goods store, often combining several standardised merchandise lines, in outlying centres where proximity to the customers assures the maximum patronage from any given residential area" (p498).

The assortment of goods offered and the reputation of a district for quality and prices attract consumers but they are deterred by the time, effort and expense of reaching it. The opinion is held that about an hour is the maximum time - that is, 20-50 miles by car, 10-15 miles by bus - people want to spend to reach a shopping centre. Various attempts have been made at measuring the attraction of a shopping centre such as Reilley's noteworthy Law of Retail Gravitation. This law states: "Two cities attract retail trade from an intermediate city or town in the vicinity of the breaking point (the 50-per-cent point) approximately in direct proportion to the population of the two cities and in inverse proportion to the square of the distances from the two cities to the intermediate town" (Converse 1958 p 29 & 746).

$$\frac{Ba}{Bb} = \left(\frac{Pa}{Pb}\right)\left(\frac{Db}{Da}\right)^2$$

where Ba is the proportion of the trade from the intermediate city attracted by City A.
Bb is proportion attracted by city B
Pa is population of city A
Pb is population of city B
Da is distance from intermediate town to city A.
Db is distance from intermediate town to city B.

A more practical formula derived from this law is (Converse 1958 p30):

$$\text{Breaking point between A and B, miles from B} = \frac{\text{Distance between A and B}}{1 + \sqrt{\frac{\text{Population of town A}}{\text{Population of town B}}}}$$

.../By

By applying the formula on all the highways from a tradir - or shopping centre town, its trade can be determined. This boundary is the 50% line. Reilley's law of retail gravitation, though not developed for highly urbanised or sparsely populated areas, nevertheless, has been found to apply in these territories with considerable accuracy and may also, with care, be made to apply to the sale of service and convenience goods.

Vance writes about Reilley's law: "His 'retail gravitation' is a characteristic of any commercial district so we must ask whether these conclusions are valid for outlying centres as well as the central business districts he considered. The substansive part of this paper corroborates his findings with respect to distance but leads us to doubt that Reilley's formulation concerning population is applicable. Within the metropolitan area with dispersed selling of mass-appeal goods the concept of gravitation has been replaced by o of dismembering the market among equal and competing centres (Vance - 1960 p497). Cohen (1963) in order to determine the accuracy of the app on of the law (as amended) put it to practical test by st the suburb of Bramley which was served by two shopping centres. The law estimated that 73.5% of the shoppers would shop at the Bramley centre and the Birnam shoppers would constitute 26.5%. The actual pull was 70.3% at Bramley and 29.7% at Birnam. A remarkable close prediction. When the Bramley-only ppers and the Birnam-only shoppers were noted the values proved to be 73.3% and 26.7%.

In the period since World War II rapid development of suburban shopping centres has taken place. The motor car has made it possible for buyers to reach them easil and parking space is more readily available. Three types of s are recognised: regional, community or intermediate, and n ighbourhood (Converse 1958). Proudfoot (1937) mentiones four the outlying

.../business

business centre, the principal business thoroughfare, the neighbourhood business street, and the isolated store cluster. These shopping centres have their own trade areas and draw some trade away from the C.B.D.

It is now apparent that a large city like Johannesburg, the central city of a metropolitan region, has many shopping districts (FIG. 10) and that each has its own tributory trade area. Speciality goods or shopping belong to the C.B.D., thus giving it a trade area which does not only include the city's municipal area, but the whole or at least part of the metropolitan region. The intensity of the attraction, however, varies because of the retail-pull exerted by other C.B.D.'s in the Witwatersrand metropolitan region.

To delimit the retail trade area of Johannesburg, not only the C.B.D. but all the other shopping districts must be regarded. The dominance of Johannesburg as the central city is illustrated in TABLE 14, which indicates what percentages of goods-value is purchased in Johannesburg, and clearly distinquishes between convenience and shopping goods.

In a survey of the retail shopping structure of the C.B.D.'s of towns in the metropolitan region (TABLE 15) Legge states that it is in the hub where we find" located the quality shopping of the region: the specialist shops; the concentration of such an exciting choice in range, price and quality as to form an irresistable centripetal force of the shopping of the region" (1962 p20).

Bengtsson (1960 p297) divides the field of retail trade into three parts according to where the customers live:

1. The central place itself, i.e. the area in the very centre of the field.
2. The umland, i.e. the inner part of the external field.
3. Other areas, i.e. the peripheral part of the external field.

.../TABLE

TABLE 14: Annual Market Potential of Roodepoort and Florida (Cohen / Tables 3 and 4).

GOODS	Values of Purchases of Florida Inhabitans %			Values of Purchases of Roodepoort Inhabitants - %		
	Roodepoort	Florida	Johannesburg	Roodepoort	Florida	Johannesburg
Food and Groceries	3.5	77.7	18.2	64.4	17.9	15.7
Meat	6.0	69.8	22.9	76.2	6.4	13.6
Mens Clothing	6.5	20.0	72.9	64.1	3.8	29.9
Women's Clothing	6.1	22.5	70.8	64.5	3.9	29.1
Childrens Clothing	5.7	22.2	71.3	67.1	4.1	26.5
Household & Hardware	4.8	54.2	39.9	66.5	7.0	22.6
Furniture	4.9	14.2	77.3	43.8	5.1	41.7
Electrical Appliance	5.0	35.8	59.3	56.6	6.0	30.9
Alcoholic Beverages	1.5	84.7	11.8	72.9	10.7	13.9
Value / R	266,200	3,207,000	2,265,000	6,737,900	1,120,400	2,270,300
%	4.6	55.8	38.4	64.3	10.7	21.6
Excluding Food/Meat	180,500	1,343,600	1,968,700	3,981,700	441,300	1,177,200
%	5.1	37.9	55.5	61.5	6.8	27.5

TABLE 15: Retail Shopping Structure of the Central Business Districts of Witwatersrand Towns (Leggo 1962 p20).+

Central Business District	S H O P P I N G U N I T S					
	Convenience	Demand	Impulse	Dept. Stores	T o t a l Units	Acres
Springs	77	272	53	83	485	14.8
Brakpan	60	105	21	58	244	7.5
Benoni	72	303	21	58	454	13.9
Boksburg	51	164	43	36	294	9.0
Germiston	77	209	42	62	390	11.9
Johannesburg	572(52%)	1,444(44%)	398(60%)	485(55%)	2,899(50%)	88.7
Roodepoort	39	199	9	16	263	8.0
Krugersdorp	96	354	53	54	557	17.0
Randfontein	44	196	22	26	288	8.8
All Central Business Districts	1,088	3,246	662	878	5,874	179.6

+ 1 Shopping Unit = 1250 square feet of floor space.

To determine the inner retail zone of Johannesburg the method employed, in the light of the absence of suitable statistics for quantification[1], interviews with some major C.B.D. concerns especially chain stores, were held. From the information gathered, the area in which retail goods were delivered, was drawn (FIG.10). One concern was of the opinion that 97½% of their delivered goods were distributed in the Johannesburg municipal area. The largest delivery areas were the north-eastern and north-western suburbs. In most cases the western limit was stated as being Roodepoort and Baragwanath, but the eastern limit was less well defined, but seemingly includes Modderfontein, Germiston and Alberton. The extent of the delivery areas of the different concerns was determined by the presence of branches in other neighbouring towns.

As mentioned above, the area delimited is that of goods delivery, but an important factor is the movement of people, both daily commuters and occasional visitors to Johannesburg, since these people undoubtedly make use of retail facilities. Thus, the retail field notably of the C.B.D. resulting from the purchasing of shopping goods, will probably coincide to the inner metropolitan region, with the Johannesburg municipal area being the more important retail area. Bengtsson (- 1960), studying the retail structure of a small Swedish town, found that "an analysis of a traffic umland thus also can give a fairly good picture of the corresponding retail trade influence. In peripheral areas, on the other hand, the traffic field reflects central functions other than those of retail trade." Although case studies, on the same lines, of other central places of different structure and sizes are not available, it points to the existence of this relationship in metropolitan areas as well, because of the very nature of the inner metropolitan region, that is, of daily contact with the hub. The peripheral retail trade areas

.../will

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1. See Bogue (1950 p153-163) for one method of quantification.

will thus tend to co-incide with the outer zone. Vance concludes that "in sum it seems that [illegible]ral business district has become the mass seller to the inno[illegible]of the metropolis, the speciality seller to the geographic city (1960 p518).

Applying Reilley's law, it seems that the division between Johannesburg and the Pretoria metropolitan region lies about 14 miles from Pretoria, that is, the smaller of the two centres. This boundary practically corresponds to the outer metropolitan boundary. However, the formulated boundary in the south lies about 14 miles beyond the outer metropolitan region which looks toward Johannesburg for retail goods, especially speciality goods. Because of the many secondary retail hubs along the east-west axis of the metropolitan area the formula does not appear to be of much value.

From studies in America it appears that "beyond the 45 mile zone there is little indication that the metropolis functions directly as a retail centre for the hinterland, as far as any significant proportion of the hinterland purchases are concerned," and "rural areas and minor cities provide all their retail requirements locally, but become heavily dependent on an urban centre if one is present" (Bogue p155 & 163). As far as Johannesburg is concerned its retail influence could not extend for that distance, because of major shopping hubs like Pretoria and Vereeniging in the north and south as well as those to the east and west.

(4). Wholesale Trade.

Wholesaling is primarily concerned with the selling of goods to "distributors for resale or to purchasers who buy for business use... (and) ... are oriented completely to other business" (Bogue 1950 p173). "In general, wholesalers prefer to locate as closely as possible to the group they serve. In the marketing of style goods, convenience is of particular importance because of the

.../frequency

frequency of contacts with the retailer... Wholesalers who sell from catalogues, by mail, by telephone, or through an outside sales force do not require sites near their customers " (Ratcliff 1949 p138).

Where the market to be served is regional or national, proximity to dealers in the same line of goods is usually desirable, since purchasing envolves comparison and selection of goods. Proximity is less advantageous when the market is local, when buyers do not visit the market, and when comparison is not important.

In the metropolis the specialisation in wholesale trade is so much greater than in retail trade, making it inconceivable that the wholesale activities of such centres exist solely for the purpose of supplying the metropolis and its suburbs. It is thought that the dependence of the hinterland upon the metropolis must be much greater for wholesale activities than for services. Retail and service establishments over a wide area appear to depend upon the wholesale establishments of the metropolis as a source of supply. This dependence appears to decrease with distance (Bogue 1950).

The metropolis is several times more specialised in wholesale trade than is any interland area, and most hinterland [illegible] is very high degree of specialisation in wholesale activities, accompanied by greater than average specialisation in other activities, appears to be one mark of the metropolis (Bogue 1950).

As with retail trade, because of the lack of statistics to place the investigation on a quantitative basis, interviews had to be relied on. Several of the largest general wholesalers in and around the Johannesburg C.B.D. were interviewed as well as some wholesalers who specialise in goods of a particular line, such as toys or bridal requisites, or who specialise in only a limited number of lines.

The wholesale sphere of Johannesburg includes the whole

.../or

of the Transvaal, and O.F.S., and those territories in the other provinces and the Protectorates which are adjacent to these two provinces. This sphere, however, is more applicable to the large general wholesalers. To them the market is mainly a regional one because the movement of imported goods from the coasts and back again proves uneconomical if rail transport is involved. Further, the Witwatersrand or local market is not more important than the rest of the region because of competition from smaller wholesalers. The large wholesalers are able to keep travellers in out-districts to gain business for them but since the smaller wholesaler is unable to afford country salesmen, they concentrate on the local market. Furtner, competition from chain-stores who buy direct from the manufacturers aids in reducing the importance of the local market. Another factor limiting the area served by the larger wholesalers is the presence of branches and headquarters in other centres, especially ports. The area served by wholesale establishments in Johannesburg includes the influence sphere of several large urban centres, since the competition with other inland wholesalers takes place on an equal footing, that is there is no uneconomic competition as in the case with ports.

As pointed out above the smaller wholesaler concentrates on the large market provided by the Witwatersrand, but this is not quite the case with the wholesaler in specialised goods, since he does business wherever required. He therefore operates on a national scale.

The areas supplying goods to the wholesalers are impossible to define since they vary with the type of goods. For example, a large general wholesaler stated that about 20% of their goods were imported, whereas one dealer in specialised goods gave the figure as 100%. The supply areas are thus national and inter-

.../national

national, whereas the distribution of goods is mainly local, regional, national and includes the Protectorates lying on the periphery of the sphere.

D. CONCLUSION.

This chapter dealt with the service functions of Johannesburg. The criteria employed were regarded the most suitable in terms of the availability of data. Although data suitable for quantification were preferred, it was only the newspaper spheres which could be limited on this basis, apart from the application of Reilley's Law of Retail Gravitation.

It was to be expected that the spheres which were determined would not coincide. Further, each influence sphere decreased in intensity as the distance from the focus increased. Generalising greatly one can say that the newspaper sphere of influence consisted of a core, the Southern Transvaal, and an outer zone, the rest of the Transvaal and the Northern O.F.S.[1] A study of incoming and outgoing telephone calls proved to be relatively unsuccessful. Retail trade had an inner core, the Johannesburg metropolitan area[2], and an outer zone comprising the rest of the Witwatersrand. The inner zone of wholesale trade consisted of the Witwatersrand and an outer zone which included the Transvaal and the O.F.S.

Five zones appear to make up the sphere of influence of Johannesburg, when it is considered as an urban centre with service functions: (i) the Johannesburg metropolitan area (Greater Johannesburg), (ii) the Witwatersrand, (iii) the Southern Transvaal, (iv) the Transvaal and Northern Orange Free State, and (v) the rest of the country.

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1. Sunday newspapers included the whole of the O.F.S. and Natal.
2. As defined by Bureau of Census.

CHAPTER VI.

CITY SUPPLY REGIONS.

A. AGRICULTURAL SUPPLY REGIONS.

1. Introduction.

The city must be fed. Only a very limited number of people are employed in agriculture in the city, a number which is unable to cater for the needs of the city's inhabitants. In the Johannesburg magisterial district the percentages of gainfully employed workers in agriculture for 1960 were 0.5% of the Whites, 0.45% of the Asiatics and 0.05% of the Coloureds (Census 1960)[1]. This of necessity gives rise to tributary areas which must supply the required agricultural produce.

The areas which produce and subsequently supply agricultural products are to a very great extent determined by natural factors, but economic considerations normally dictate to which markets these products are sent. From delimitations of the boundaries of supply areas of various products, the economic influence is seen in the zones of conflict which arise between two areas supplying different markets.

Though market gardening and dairying are carried on at an intensive level close to the heavy populated city and are of great significance, and small-holdings are characteristic of the rural areas adjacent to the city, the city is still compelled to draw the bulk of its agricultural supplies from rural areas further afield. The agricultural areas to be discussed here are those areas supplying meat, fresh milk and vegetables and fruit.

To determine the supply regions it is possible to make use of mere numbers or quantities. Such a method does, however, not

.../indicate

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1. In 1951 only 1.2% of the Witwatersrand's workers were employed in agriculture, while agricultural products were responsible for 97% of the region's net imports (Green 1957b).

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1. In 1951 only 1.2% of the Witwatersrand's workers were employed in agriculture, while agricultural products were responsible for 97% of the region's net imports (Green 1957b).

indicate the two-way relationship which exists within the supply region. Firstly, there is the importance of the receiving centre to the supply area and secondly, the importance of the supply area to the receiving centre. Where possible, it has been attempted to indicate this relationship, but due to insufficient data as regards certain products, it has been impossible to carry out the delimitation of some supply area boundaries on this basis.

2. Livestock Supply Regions (FIG. 11).

Detailed statistics[1] of the total number of cattle, calves, pigs and sheep sent to abbatoirs on the Witwatersrand from various regions in the Republic, are available and it was possible to attempt an indication of the two-way relationship existing between receiving centre and supplying areas. The method used for delimiting primary and secondary livestock regions for the Witwatersrand[2] is outlined below.

Firstly, an area is primary when 50% or more of all cattle or sheep or calves or pigs supplied by that area to all slaughtering centres, are slaughtered on the Witwatersrand and the total is more than the average (Area 1 in TABLE 16). Secondly, an area is secondary when 50% or more of all the cattle or sheep or calves or pigs supplied by that area to all slaughtering centres, are slaughtered on the Witwatersrand and the total is less than the average but more than half of the average (Area 2 in TABLE 16). An area is also secondary if less than 50% of its animals are slaughtered on

.../the

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1. The Meat and Livestock Control Board has statistics for South Africa's 76 slaughtering areas and for S.W.A., Basutoland and Swaziland (1962/63). Data supplied in correspondence and extracted from official records.

2. Statistics for the separate abbatoirs on the Witwatersrand at the time of writing were not satisfactory to determine the supply regions of Johannesburg only.

the Witwatersrand, but the total is more than the average (Area 3 in TABLE 16).

TABLE 16: Examples of Primary and Secordary Livestock Supply Regions (Hypothetical).

SLAUGHTER CENTRE.	SUPPLY REGIONS.					
	Area 1	Area 2	Area 3	Area ..	Area 50	Total
WITWATERSRAND	7,000	1,100	3,000	.....	.....	100,000
PRETORIA	6,100	100	3,000	.....	.....	.....
TOTALS	13,100 (PRIMARY)	1,200	12,000 (SECONDARY)	.....	.....	.....

Average = $\frac{\text{Total slaughtered at centre i.e. Witwatersrand}}{\text{Total no. of areas supplying Witwatersrand}}$

= $\frac{100,000}{50}$ = 2,000.

The livestock supply regions (primary and/or secondary areas) for the Witwatersrand (FIG. 11)[1] as determined by the method outlined, may be regarded as that of Johannesburg, since the number of livestock slaughtered at Johannesburg dwarfs that of its neighbouring abbatoirs.

(a) Cattle: The cattle supply regions, the determination of which was based on an average of 8816 cattle per supplying area, includes almost all parts of the Transvaal, the Northern Cape and the northern half of the O.F.S. The secondary region and the areas falling outside the supply region in the Transvaal is due, firstly, to the presence of Pretoria as a rival abbatoir, and secondly, to the relatively small number of cattle coming from the Eastern Transvaal Highveld. Two further areas of very little importance, surrounded by the supply regions, is the Vereeniging-Vredefort-Heilbron area and the O.F.S. Goldfields.

The area in the Republic which sends the largest number of cattle to the Witwatersrand, is the Vryburg-Mafeking area. This

.../primary

1. Secondary Supply Regions not shown on map.

primary area is, however, surpassed by far in importance by South West Africa, which supplies cattle in excess of 120,500 annually (1962/63 average), to the Witwatersrand. S.W.A. is not shown on the map as a primary area because it is not subdivided into statistical units comparable to those of the Republic and, therefore, a true reflection may not be obtained as to its importance as a supply region.

Of the total number of cattle slaughtered by the nine centres[1] under the control of the Meat and Livestock Control Board, just more than half was slaughtered on the Witwatersrand, and of this portion 53.4% came from the primary supply region and 11.4% from the secondary supply region. If S.W.A. (24%) were to be included in the primary region then this region sent 77.4% (TABLE 17).

From the values given above and those which will be given when the other livestock are discussed, it is obvious that the primary and secondary supply regions are regions which undoubtedly centre on Johannesburg. A delimitation of the livestock supply regions is therefore essential in determining the final sphere of influence of Johannesburg or any other large centre.

(b) Calves: The supply regions for calves, for obvious reasons, coincide to a great extent with the cattle supply regions. It is only the secondary supply regions on the Eastern Transvaal Highveld and the Northern O.F.S. which fall outside the cattle supply regions. The extent of the regions are, however, smaller than that for cattle since the calves supply regions were more closely situated to the Witwatersrand. In fact, the most important area was the Witwatersrand which supplied about 60% of the total number of calves.

(c) Sheep: The sheep supply regions are typical of regions which do not have Johannesburg as their centre. They lie

.../to

1. Cape Town, the Witwatersrand, Pretoria, Durban, Pietermaritzburg, Port Elizabeth, East London, Bloemfontein and Kimberley.

primary area is, however, surpassed by far in importance by South West Africa, which supplies cattle in excess of 120,500 annually (1962/63 average), to the Witwatersrand. S.W.A. is not shown on the map as a primary area because it is not subdivided into statistical units comparable to those of the Republic and, therefore, a true reflection may not be obtained as to its importance as a supply region.

Of the total number of cattle slaughtered by the nine centres[1] under the control of the Meat and Livestock Control Board, just more than half was slaughtered on the Witwatersrand, and of this portion 53.4% came from the primary supply region and 11.4% from the secondary supply region. If S.W.A. (24%) were to be included in the primary region then this region sent 77.4% (TABLE 17).

From the values given above and those which will be given when the other livestock are discussed, it is obvious that the primary and secondary supply regions are regions which undoubtedly centre on Johannesburg. A delimitation of the livestock supply regions is therefore essential in determining the final sphere of influence of Johannesburg or any other large centre.

(b) Calves: The supply regions for calves, for obvious reasons, coincide to a great extent with the cattle supply regions. It is only the secondary supply regions on the Eastern Transvaal Highveld and the Northern O.F.S. which fall outside the cattle supply regions. The extent of the regions are, however, smaller than that for cattle since the calves supply regions were more closely situated to the Witwatersrand. In fact, the most important area was the Witwatersrand which supplied about 60% of the total number of calves.

(c) Sheep: The sheep supply regions are typical of regions which do not have Johannesburg as their centre. They lie

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1. Cape Town, the Witwatersrand, Pretoria, Durban, Pietermaritzburg, Port Elizabeth, East London, Bloemfontein and Kimberley.

to the south and south west, covering the drier parts of the Cape Province and large parts of the O.F.S., excluding the Sasolburg-Vredefort-heilbron area, the goldfields and the central area. The natural element (climate and vegetation) as a determining factor in the positioning of the regions is especially noticeable.

Delimited on a basis similar to that of cattle and using an average of 26,605 it was found that the primary supply region accounted for 73% of the sheep slaughtered on the Witwatersrand (TABLE 17). The largest supply area was the Taungs-Kimberley area which supplied more than 175,300 animals annually (1962-63). The secondary areas (20%) were found mainly to the south of the primary region in the Cape Province. An important secondary region almost attaining primary **status**, is the Witwatersrand with about 22,000 sheep.

TABLE 17: Slaughter of Livestock on Witwatersrand (W.W.R), 1962-63.

LIVE-STOCK	WWR Total as % of Total of Nine Controlled areas.	Stock units slaughtered on WWR	Primary Supply region as % of WWR Total.	Secondary supply region as % of WWR total
CATTLE	51.7	502,521	77.4+	11.4
SHEEP	40.7	202,356	73.1	20.3
CALVES	54.2	76,022	86.9	5.7
PIGS	53.8	58,645	77.7	12.1

+ Includes S.W.A.

(d) Pigs: As was the case with calves, the pigs supply regions corresponded to those of cattle, but covered only a smaller portion of the Transvaal, as they did not include large parts of Northern and Eastern Transvaal. The chief supplier was the Witwatersrand area with 42% of the total number of pigs slaughtered at abbatoirs on the Witwatersrand.

.../(e) Livestock

(c) Livestock Supply Zones: Inspection of FIG. 11, showing the primary livestock regions for 1962-63, reveals five groupings if cattle and calves are combined (Tracing). Zone 1, where all primary livestock zones are represented, covers a large portion of the Northern O.F.S. and the South-Eastern Transvaal. North of Zone I lies Zone II which stretches from Mafeking Eastwards to Volksrust and Northwards to Rustenburg. Zone III (cattle and/or calves) occurs in large separate areas of the Northern and Eastern Transvaal and the Northern and North-Eastern O.F.S. Zone IV (sheep) covers the Central O.F.S. and Northern and North-Western Cape. Zone V comprises the magisterial district of Potgietersrus. Surrounded by the different zones are four unimportant supply areas, namely the O.F.S. Goldfields, the Vereeniging-Vanderbijlpark area, the Central Transvaal and the Central O.F.S. The unimportance of the latter two areas is due to these areas being the primary supply regions of Pretoria and Bloemfontein respectively, but is not an indication that they do not supply animals for slaughter to the Witwatersrand.

3. MILK SUPPLY REGION.

It has already been stated that a city exercises an influence, to a lesser or greater degree, on the agricultural enterprises of the rural or semi-rural areas surrounding it. This influence is not so noticeable when the product supplied by the rural area is non-perishable. In such cases the factor carrying the most weight in deciding to which urban market the product is to be sent, is an economic one, meaning that the profit to be made on the selling of the product is the decisive factor. Distance to the market centre and the time taken for the product in reaching that market is normally not of very great importance. However, when a perishable product is to be marketed, speed is of vital importance and consequently also distance.

.../An

An excellent example of a perishable product which has to reach the market quickly, is fresh milk. The areas that supply fresh milk are, therefore, limited to situations within a reasonable distance of the consuming centre. With modern rail and road transport, it is possible for the suppliers to be situated a fair distance from the consumers, but the actual road and rail network is of extreme importance.

Johannesburg daily consumes about 60,000 gallons of fresh milk which is supplied by 850 farmers. Individual contributions vary from 5 to 2,500 gallons per day. It stands to reason, therefore, that the city's influence on its neighbouring rural land is very marked, since it is on this surrounding land that such a large quantity of milk is produced.

By making use of a list of milk producers at 2nd January, 1963[1], and plotting the exact position of each producer, as well as indicating the quantity of fresh milk supplied daily by them[2], the milk supply region (1963) was limited. Three subdivisions could be identified (FIG. 12). A primary zone with a radius of about 25 miles and centred on a point about 7 or 8 miles south of Johannesburg, provides about 60% of the total. Indicating the influence of the city on the agricultural activity of neighbouring areas, the densest concentration of producers occurs to the south and west of the city, but to the east the East Rand towns become important consumers drawing the milk requirements from their own surroundings. All suppliers in this primary region make use of motor vehicles to transport the milk to the distributing depots.

A secondary supply zone, consisting of two broad extensions, one to the east and the other to the west of the primary zone provides about 30% of the total daily fresh milk

.../supply.

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1. City Health Dept., Johannesburg.
2. Quantities plotted on Topocadastral maps, 1;250,000.

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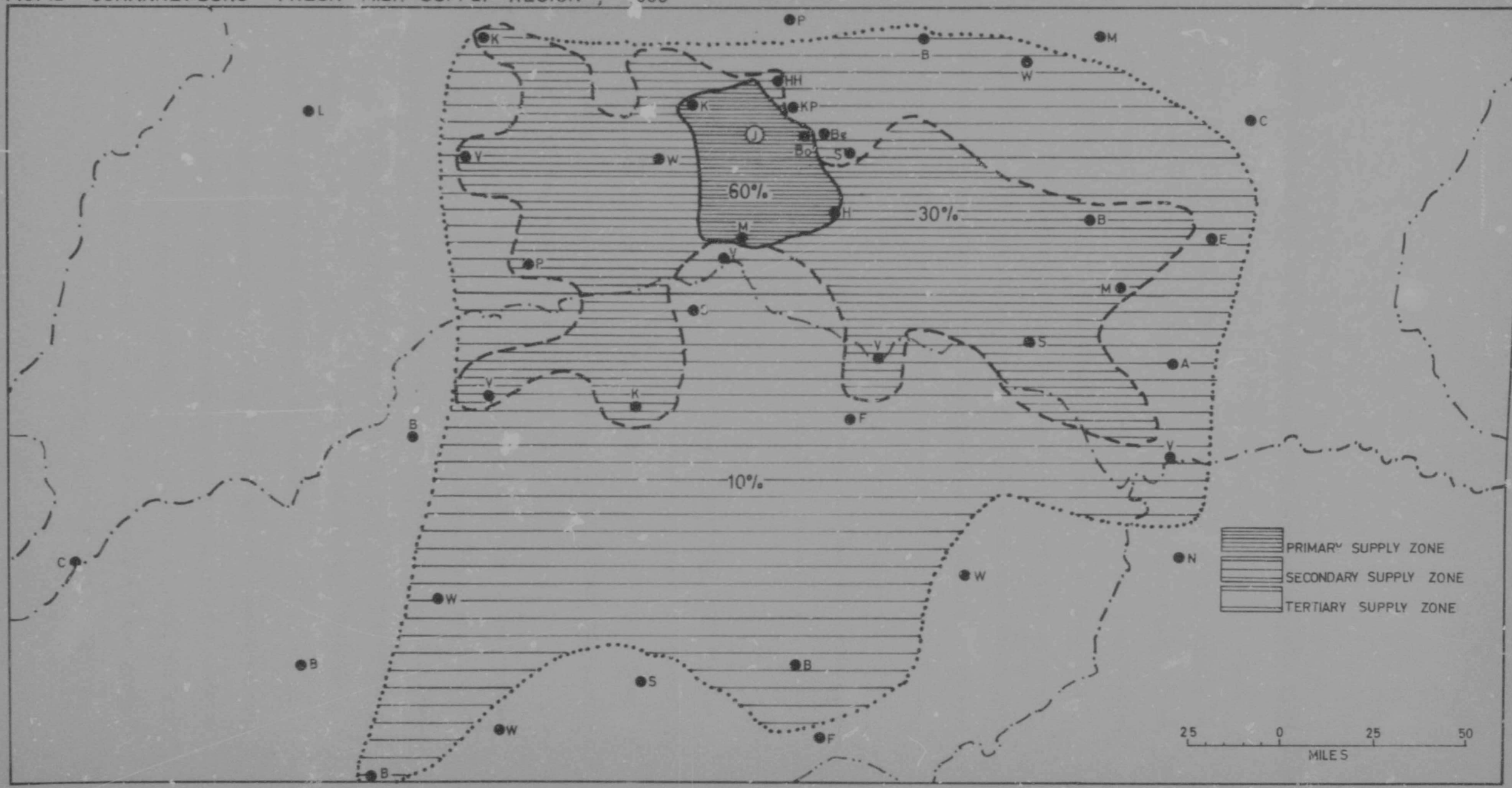
1. City Health Dept., Johannesburg.
2. Quantities plotted on Topocadastral maps, 1;250,000.

FIG. 12: JOHANNESBURG - FRESH MILK SUPPLY REGION, 1963



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supply. To the north of Johannesburg the influence exerted by Pretoria becomes obvious, and an area of overlap is found where some producers send supplies of milk to Johannesburg and others again send to Pretoria. From the work of Cole (1955), Viljoen (1957) and the present study, this zone of overlap between the two centres lies astride a line joining Halfway House and Kaalfontein. The limits of the secondary supply zone vary from between 75 and 125 miles from Johannesburg. The densest concentration of producers in this sub-region are found along the main roads leading to Johannesburg or in areas which have ready accessability to these roads, for example along the Johannesburg-Volksrust National Road. A very dense concentration also occurs in the Koppies Settlement area in the O.F.S. In the secondary zone, all but two farmers, at Devon and Eloff, made use of road transport, vehicles being owned privately or by organizations.

A milk supply zone of tertiary importance provides the rest of the total daily milk supply. Just more than 30 farmers, the majority situated in the O.F.S., between 115 and 155 miles from Johannesburg, made use of rail transport. These farmers supplied only about 5% of the total daily milk supply.

In conclusion, it may again be pointed out, that because of the perishable nature of fresh milk, the suppliers prefer to concentrate near the consumers of their product, and the distribution pattern of farmers outside the supply nucleus, is determined by the main road network. It is only in the furthest outlying supply areas where rail transport is important.

As quick transport is imperative and the communication pattern within the daily fresh milk supply region of Johannesburg has not altered to any noticeable extent in recent years, the present supply region, although it supplies more milk and has grown in size, coincides closely with the supply region of 1930 and

.../even

even illustrates the same development pattern of the supply region of 1938 (Cole 1955).

4. VEGETABLE AND FRUIT SUPPLY AREAS.

Johannesburg is the chief market in South Africa. In 1962-63[1] sales on the Municipal Produce Market represented 40.2% of the Republic's total, double that of Cape Town, the second most important market, and amounted to R16,346,934 (Van Waasdijk 1965 and Market Master 1963). About 70% of this annual supply originated beyond the Witwatersrand regional boundary, while 72% of this total was consumed in Johannesburg itself (Green 1957b).

Vegetables and fruit are drawn from many areas, often beyond the Transvaal's borders. Each vegetable or fruit has its own particular requirements with regard to climate and soil, thus resulting in the seasons during which the different vegetables and fruit may be grown, varying from place to place. TABLE 18 has been compiled to indicate the various regions of supply and the seasons of supply, the latter showing the expanding and contracting nature of Johannesburg's influence as the seasons of supply vary. Unfortunately data showing the origin of supplies sold on the municipal market are not available therefore a detailed examination, as was the case with the meat and milk supply regions, is not possible. Some of the vegetables and fruits will, however, be discussed in more detail below.

(a) Potatoes: Potatoes are the most important product sold on the Johannesburg Produce Market, being responsible for 29% and 23% of the total turnover of R14,917,300 and R16,346,900 for 1962 and 1963 respectively (Market Master 1963). The Transvaal Highveld is the main area of production, not only for Johannesburg but produces about 50% of the annual South African potato production. The Witwatersrand was also an important producer with

.../1,050 morgen

1. Year ended 30th June, 1963.

1,050 morgen planted to potatoes yielding about 97,300 bags of 150 lbs. each for 1962-63[1](Potato Board - 1963). Production in this area is primarily by gardeners and an important portion of the crop is sold in their own vegetable markets or provided directly to vegetable markets on the Rand. About 45% - 50% of all potato sales in the Republic's nine controlled areas take place on the Witwatersrand where the Johannesburg market is responsible for 94% of the sales in terms of value and quantity (Potato Board 1963), showing Johannesburg's supremacy in the marketing field as well.

(b) Bananas: Banana sales on the Johannesburg Municipal Market amounted to R1,707,436, that is, 10.4% of the total turnover for 1962-63[2] (Market Master 1963). The Rand together with Pretoria absorbed 61% of the quantity sold by the Banana Control Board during this period (Banana Control Board 1963). Figures reflecting the contribution of the various production areas to Johannesburg are not available but the percentages marketed through pools according to production areas, however, do suggest their relative importance. Of the 744,048 units of 100 lbs. each sold during the above period 31.6% came from Mocambique, 20.0% from White River, 18.8% from Levubu, 16.8% from Letaba, 6.1% from Malelane, while Natal, the North-Eastern Cape and Swaziland contributed 6.7% (Banana Control Board 1963).

(c) Citrus: During 1962-63[2] sales handled by the Citrus Control Board amounted to R425,401 or 2.6% of the total turnover on the market, while commission agents marketed citrus to the value of R537,572 representing 3.3% of the turnover. Together, citrus represented 5.9% of the total annual turnover on the Johannesburg market (Market Master 1963). The chief areas of supply are the Eastern Transvaal (Nelspruit, White River and Lydenburg), the Northern Transvaal (Tzaneen, Louis Trichardt, Potgietersrus and

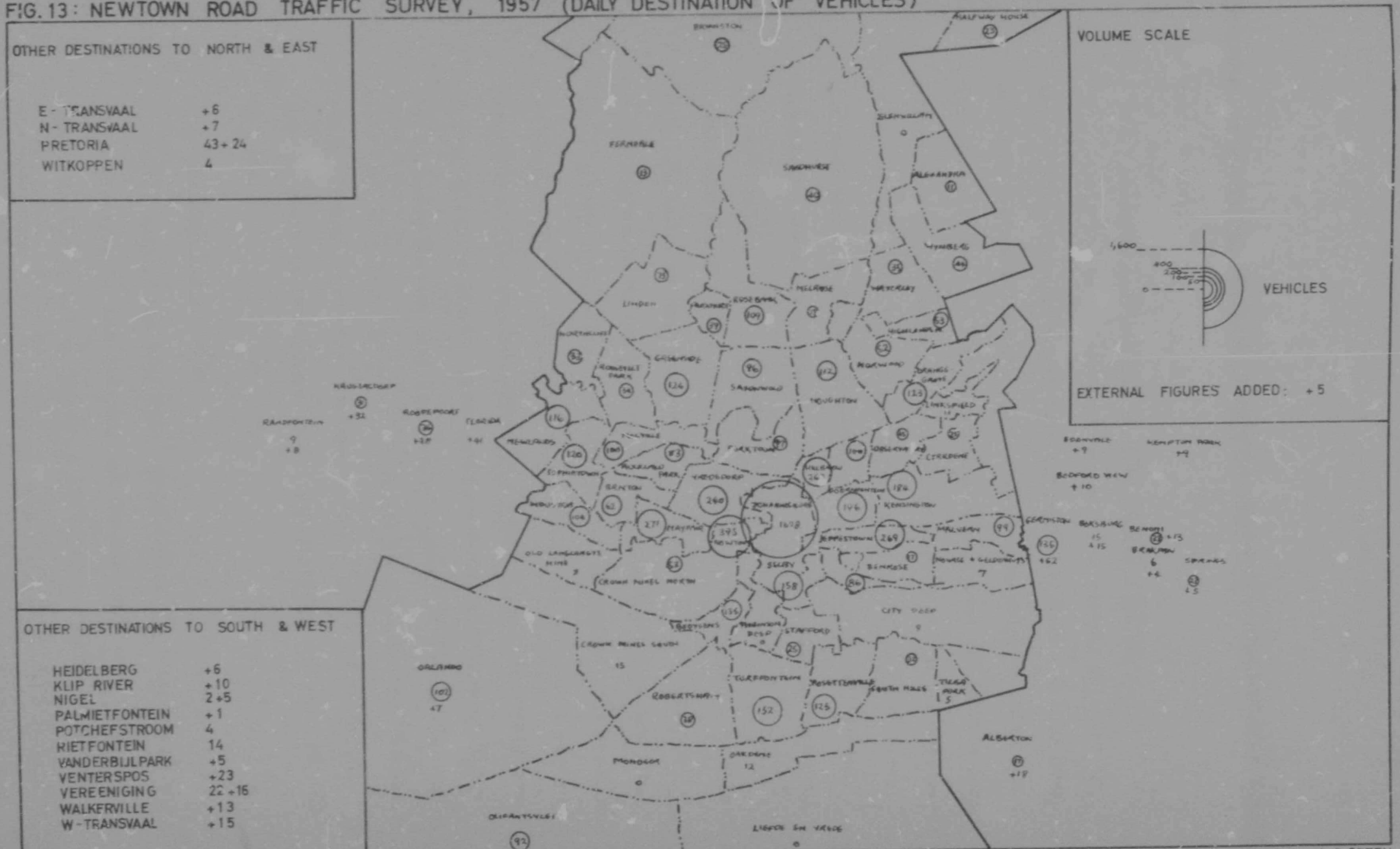
.../Groblersdal

1. Year ended 30th September, 1963.
2. Year ended 30th June, 1963.

TABLE 18: Place of Origin and Season of Supply of Vegetables and Fruit sold in Johannesburg.

PRODUCE	AREA								
	Local	Highveld.	N.Tvl.	Lowveld	N.E.Tvl	W.Tvl.	O.F.S.	Cape	Natal.
Potatoes	Nov-Feb	Jan-Aug	May-Nov	Aug-Oct	May-Sept	July-Sept	June-Sept		
Tomatoes	Nov-March		March-Nov	March-Nov	Jan-Dec	Jan-March			
Onions	Nov-March		Aug-Sept					March-Aug	
Pumpkins	Dec-Jan	Dec-April	Oct-Feb	Aug-Sept	May-Oct				
Hubbard Squash	Nov-Feb			Aug-Sept					
Gem Squash	Oct-April			March-Nov					
Marrows	Oct-March			March-Nov					
Sweet Potatoes	Nov-May		May-Oct		May-Oct				
Carrots, Beet Roots, Lettuce	Jan-Dec								
Cabbage	Oct-April			May-Oct	May-Oct				
Cauliflower	April-Nov	May-Aug							
Beans	Oct-April		May-Oct	May-Oct					
Peas	Oct-April	Jan-April		May-Oct					
Pawpaws				March-Nov	March-Nov				
Quavas				Jan-Dec					
Avocado Pears				Jan-Dec					
Grenadellas				Jan-Dec					
Musk Mellons	Oct-Jan		Aug-Nov					Jan-April	
Water Melons	Oct-May		Oct-Nov						
Grapes								Jan-May	
Citrus			Jan-Dec	Jan-Dec	Jan-Dec	Jan-Dec	Jan-Dec	Jan-Dec	
Bananas			Jan-Dec	Jan-Dec	Jan-Dec				
Naartjies			May-Jan	May-Jan	May-Jan	May-Jan			
Peaches	Oct-April							March-Apl	
Plumbs	Nov-Feb							Jan-Feb	
Apricots	Oct-Jan							Dec-Jan	
Apples			Nov					Jan-Dec	
Pears								Jan-Dec	
Pineapples								Jan-Dec	Jan-Dec
Mangoes			Oct-Apl	Oct-Apl					

FIG. 13: NEWTOWN ROAD TRAFFIC SURVEY, 1957 (DAILY DESTINATION OF VEHICLES)



L. P. GREEN

Groblersdal) and the Western Transvaal (Rustenburg, Zeerust and Groot Marico).

5. INTERNAL DISTRIBUTION OF AGRICULTURAL PRODUCE.

It has been shown that agricultural produce required by the city are drawn primarily from beyond its borders and are often collected at central points such as the Johannesburg Municipal Produce Market. From here the produce is distributed and becomes part of the movement of goods and people in the city and in the metropolitan region. FIG. 13, "compiled from an internal traffic survey, (of road vehicles registered within the Johannesburg magisterial district), shows the destination of road vehicles leaving Newtown, the site of the produce market, abbatoir, and livestock market, Indian Market and allied traders, in January, 1957" (Green 1957a p9). The outer metropolitan boundary included the Witwatersrand from Randfontein to Springs and Halfway House to Klip River. The inner metropolitan boundary is not as clearly defined, but taken in conjunction with an external traffic survey and relevant local circumstances, "the general metropolitan pattern is undoubtedly confirmed by the internal market survey, and the predominance of the Johannesburg central area is strongly emphasised" (Green 1957a p10). This predominance is probably due to the demands of a day population which reached a potential maximum of some 275,000 people during working hours in 1954 (Green 1957a) and probably well over 300,000 in 1964.

B. THE LAND USE PATTERN.

Mention has been made repeatedly of the interrelationships existing between the city and its surrounding country side. The central city has an impact on the urban and rural land uses in the area around it. In this chapter the effect of Johannesburg on its rural surroundings will be examined with the purpose in mind

.../to

Author Hattingh Phillippus Stefanus
Name of thesis Johannesburg's sphere of influence. 1966

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