

A RECREATIONAL SURVEY  
OF THE ORETI RIVER, SOUTHLAND  
NOVEMBER 1974 - APRIL 1975

BY  
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## 1. INTRODUCTION

In 1974, the Southland Catchment Board was called on to develop, over a five year period, water management and allocation plans for the Oreti, Mataura and Aparima Rivers. As a pre-requisite, water resource reports were required for each river, detailing all aspects of water utilisation.

Recognising the importance of fisheries, wildlife and recreational usage in relation to water resources, the Board asked the Southland Acclimatisation Society (S.A.S.) to provide it with information concerning recreational usage of each river involved. In turn, the Society requested Fisheries Management Division (FMD), Ministry of Agriculture and Fisheries, to help provide advice on collecting this information.

Work commenced on the Oreti River (the first of the three waters nominated by the Board for study) in November 1974, and continued until April 1975. The major effort went into a recreational survey of the Oreti over the whole of the above period. A secondary project was a fishery survey of the Oreti conducted in January 1975.

On completion of the field work in April 1975, the survey raw data sheets were forwarded to FMD for analysis and preparation of the survey report. A preliminary analysis was carried out, and this appeared in the Society's Annual Report for 1975, with a final report expected to follow shortly. However, this was not forthcoming; the officer responsible for the investigation left FMD and the report was left unfinished. Subsequently, in April 1978, all FMD freshwater work was taken over by Fisheries Research Division (FRD).

In November 1979, the Society contacted FRD to find out what had become of the report. The original files, dating back to 1975, were located and the task of writing up the data given to the writer of this report.

From the foregoing history, it will be evident that only the Society field officers who carried out the field work have any first-hand knowledge of the data and original intentions of the survey. Consequently, the writer's knowledge of the Oreti system is less than complete, although discussions with Mr Roger Sutton (Senior Field Officer of the Society) have filled in some of the gaps in the original files. It is therefore hoped that despite any limitations arising from the writer's unfamiliarity with the data, this report will still be able to meet the requirements for which it was intended over five years ago.

## 2. PREVIOUS WORK

The Oreti trout fishery has attracted a moderate degree of attention in the literature. Allegations that the fishery was declining were investigated by Percival (1932), but were found to be unsubstantiated. More general information on the fishery, collected from angling diaries, was documented by Allen and Cunningham (1957) and Graynoth and Skrzyński (1974). Marine Department investigations by Boud and Eldon (1959) and Boud (1962) showed that the majority of takeable trout in the river were two-year-olds between 23 and 30 cm in length; larger fish were confined mainly to the headwaters.

There is no information available relating to general recreational usage of the river as a whole. Brief mention of the estuarine regions was made in a report to the Invercargill City Corporation from the City Engineer (1976), which stated that a random survey of Invercargill householders found that 43% of the households questioned used the New (Oreti) River estuary for recreational purposes.

### 3. GENERAL PHYSICAL DESCRIPTION OF THE ORETI

The Oreti River rises in the Thompson Mountains west of Lake Wakatipu and flows south for approximately 200 km, entering Foveaux Strait via the New River Estuary on the western boundary of Invercargill (Fig. 1). Total catchment area is 3,510 km<sup>2</sup>; this includes the 1,062 km<sup>2</sup> catchment of the Makarewa River, which joins the Oreti just above the tidal limit.

A profile of the river is shown in Figure 2. Throughout most of its length, the river flows over a wide shingle flood bed with long runs and rapids and a few pools. Above Mossburn (altitude 290 m) the river flows through open tussock basins with limited vehicle access; a four-wheel-drive vehicle is necessary in places. The remainder of the river is readily accessible from either bank. State Highway No.6 follows the east bank from Lumsden to Winton, and a network of minor roads gives access to other parts of the river.

Rainfall is uniform over most of the catchment, averaging about 900 mm (35"), but increases appreciably in the headwaters above Mossburn. There is also an increase near the coastline, Invercargill having a mean annual rainfall of 1042 mm (41"). The winter months of July and August show the lowest rainfall, with February having the next lowest. This pattern is to some degree reflected in the flow records (Fig. 3), the lowest flows occurring in March and April. There is however, considerable annual variation, and flow records are not available for long enough to establish the long-term pattern. Mean discharge at the S.H.99 bridge over the period October 1977 to March 1979 was 47 m<sup>3</sup>s<sup>-1</sup>; the average contribution from the Makarewa over the same period was a further 15 m<sup>3</sup>s<sup>-1</sup>. The lowest discharge ever recorded at the bridge was 1.3 m<sup>3</sup>s<sup>-1</sup> in February 1971, while the highest flows were recorded during the floods of June and October 1978, being

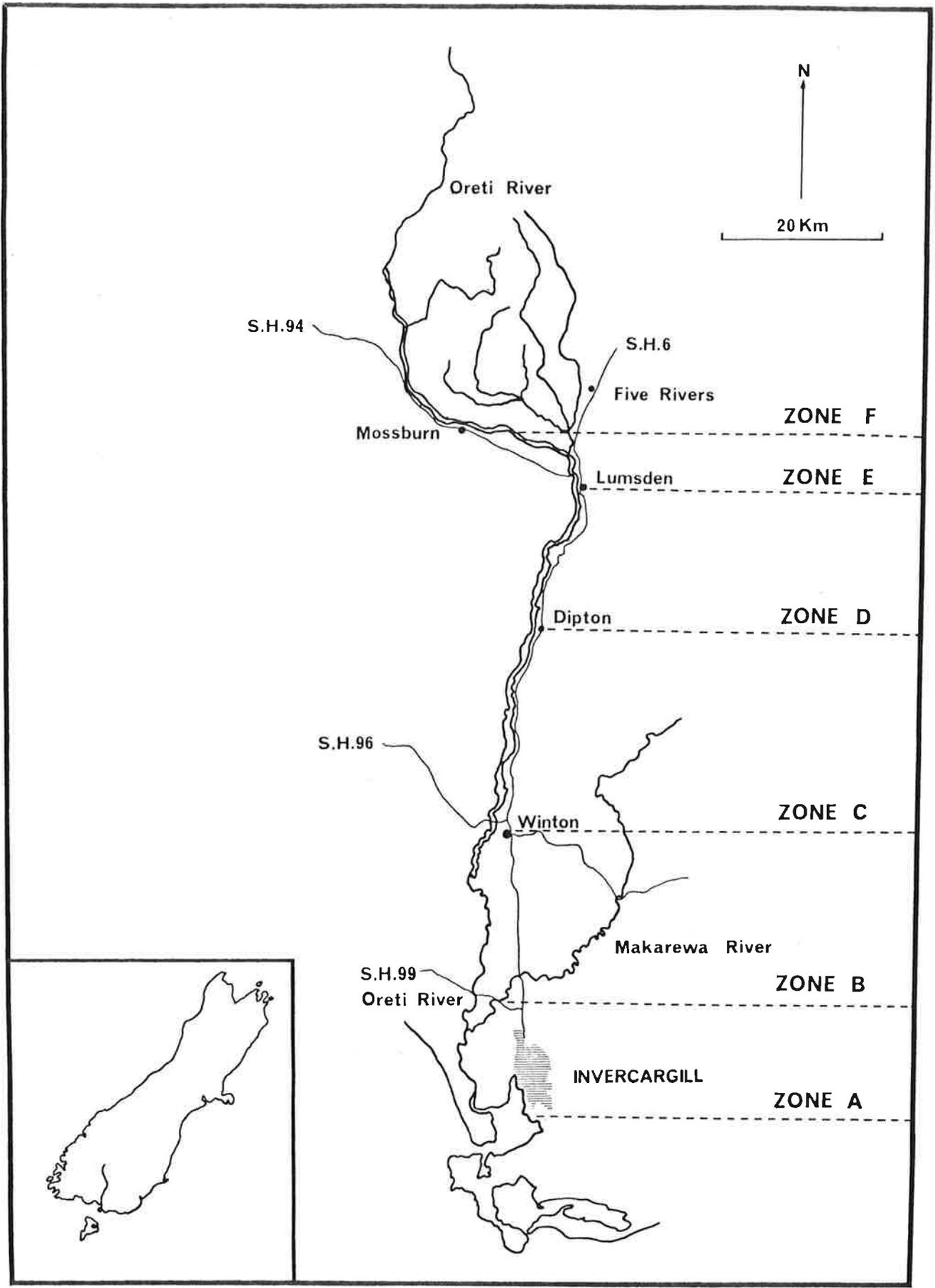


FIGURE 1. Map of the Oreti catchment.

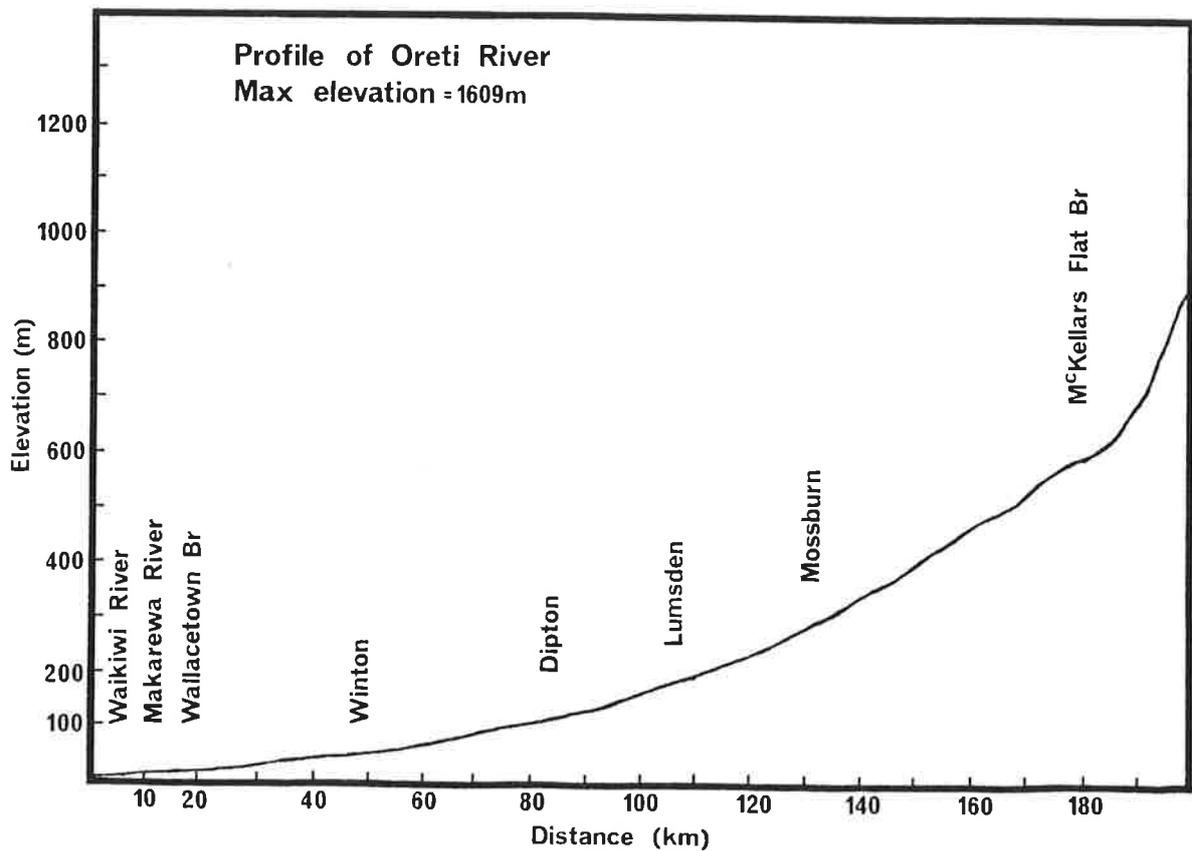


FIGURE 2. Profile of the Oreti River from the New River Estuary at Dunns Road to the headwaters. (The first 5 km in the headwaters have not been included because of space limitations.) (Graph courtesy of Southland Catchment Board.)

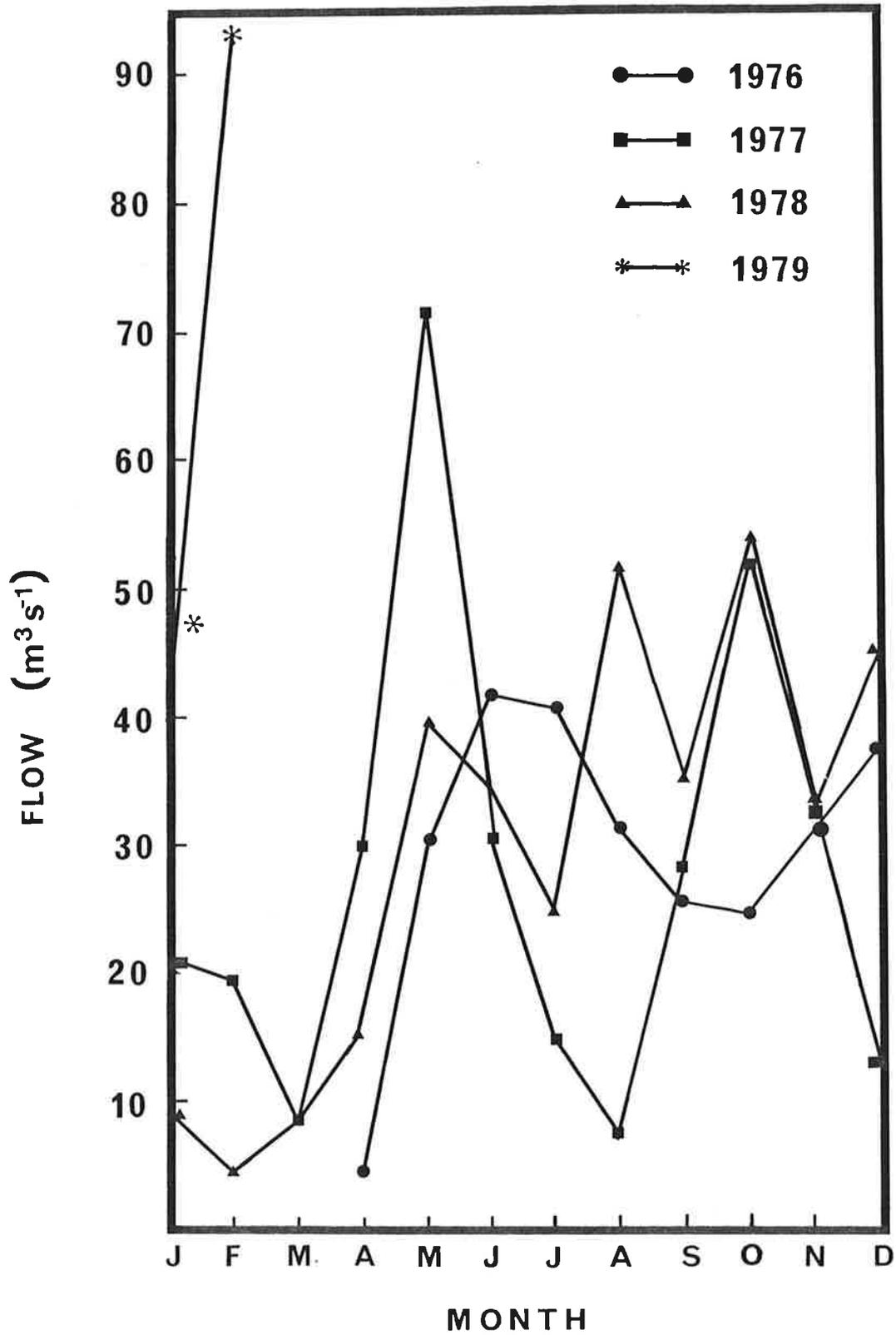


FIGURE 3. Average monthly flows for the Oreti River at Lumsden, April 1976 - February 1979.

respectively  $1,220 \text{ m}^3\text{s}^{-1}$  and  $1,260 \text{ m}^3\text{s}^{-1}$ .

Water is taken from the Oreti for irrigation (mostly in the Mossburn - Five Rivers area), industrial purposes (gravel washing and freezing works use) and domestic water supply. Gravel wash water is discharged back into the river, reducing water clarity for some distance downstream. At the time of writing there are six plants operating below Lumsden.

The total take allowed by existing water rights (including bore water) is  $1.32 \text{ m}^3\text{s}^{-1}$ , of which  $0.53 \text{ m}^3\text{s}^{-1}$  is used for the Invercargill water supply. More relevant to the recreational users viewpoint is the discharge of freezing works effluent into the Makarewa. This amounts to  $0.66 \text{ m}^3\text{s}^{-1}$  and has a significant effect on the Oreti below its confluence with the Makarewa. The Southland Catchment Board is currently conducting water quality surveys on the Oreti and Makarewa. Results to date, although limited, show increased levels of such pollutants as phosphorus and ammoniacal nitrogen in the lower Oreti.

#### 4. THE RECREATIONAL SURVEY

To evaluate recreational usage of the Oreti, the Southland Acclimatisation Society conducted a field survey of the river during the 1974/75 season. The survey design was carried out after consultations with FMD and was based on a survey of the Rangitata River carried out over the 1973/74 season (Hardy 1975). The survey was not aimed at obtaining specific data with any degree of statistical accuracy but was instead intended to provide a general picture of recreational usage of the Oreti.

#### 4.1 Methods

In order to make the optimum use of available personnel, the river was divided into six zones and the sampling stratified so as to allow for maximum coverage of those areas where, in the opinion of the Society Field Officers, recreational usage was heaviest. The zones (see Fig. 1) were -

Zone A : River mouth - Riverton Highway (S.H. 99)

Zone B : S.H. 99 - Winton

Zone C : Winton - Dipton

Zone D : Dipton - Lumsden

Zone E : Lumsden - Mossburn

Zone F : Mossburn - Headwaters.

Data collection was carried out on fifty-three randomly chosen days, stratified so that weekends and holidays were more heavily sampled than weekdays. The number of zones sampled each day was varied. Generally, Zone A (where usage was known to be high) was covered together with up to four other zones. This was done so that the data for Zone A would form a fixed reference point for comparison with other zones.

The distribution of sampling effort is shown in Table 1. Although it would have been desirable to cover the period August 1974 to May 1975 (to include the full range of seasonal activities) this was not possible, since the survey was set up at very short notice. The actual dates covered were 17 November 1974 to 30 April 1975.

A copy of the survey recording form used is shown in Appendix I. A separate form was filled in for each zone surveyed on a given day. There was some variation in the hours covered from day to day, so as to include the full range of daily activities.

TABLE 1. Distribution of sampling effort (number of weekends/holidays and week days sampled during 17 November 1974 - 30 April 1975).

Zone	Weekends and Holidays	Weekdays
A	25	18
B	14	10
C	11	7
D	6	3
E	13	13
F	8	1

For this period:

Total number of weekends/holidays= 54

Total number of weekdays = 111

As an adjunct to the main survey, fishing information was collected from individual anglers. Coverage was not intended to be exhaustive, the recreational survey having priority at all times. Because of this, rangers interviewed anglers only if time permitted, and the small amount of data collected does not therefore justify inclusion in the main body of this report. A brief summary of the data is presented in Appendix II. Also presented (as Appendix III) is an analysis of some private angling records offered to the Society by Mr C.W. Williams of Invercargill as a means of augmenting their data.

## 4.2 Results

### 4.2.1 Total Recreational Use

The preliminary analysis of the survey data (from the 1975 S.A.S. Report) is presented in this report as Appendix IV. This analysis distinguished between water users (e.g. boaters, swimmers) and non-water users (e.g. picnickers, campers) and also considered weekends and week days separately. However, no attempt was made to obtain results for specific activities.

Defining a Recreational Day Unit (R.D.U.) as one person observed at some time during one day, estimates were made of the total R.D.U.'s for each zone, month, user type and day type, over the entire survey period. The main points to emerge were:

- (i) Estimated usage for the six month period November 1974 to April 1975 was 40,000 R.D.U.'s.
- (ii) Weekend and holiday activity accounted for over 90% of the total use.
- (iii) Zone A accounted for over half the total use.

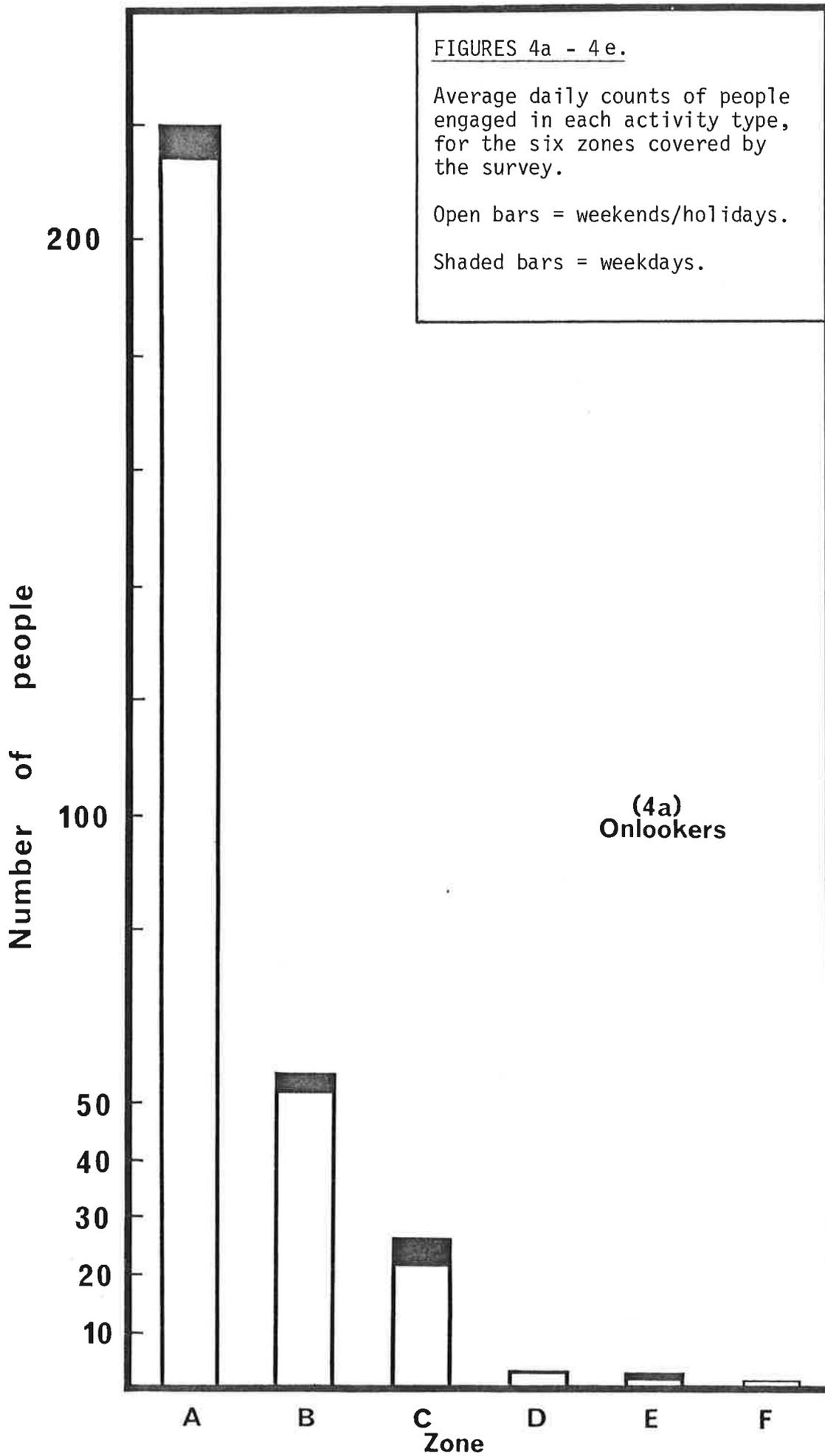
#### 4.2.2 Characteristics of Each Zone

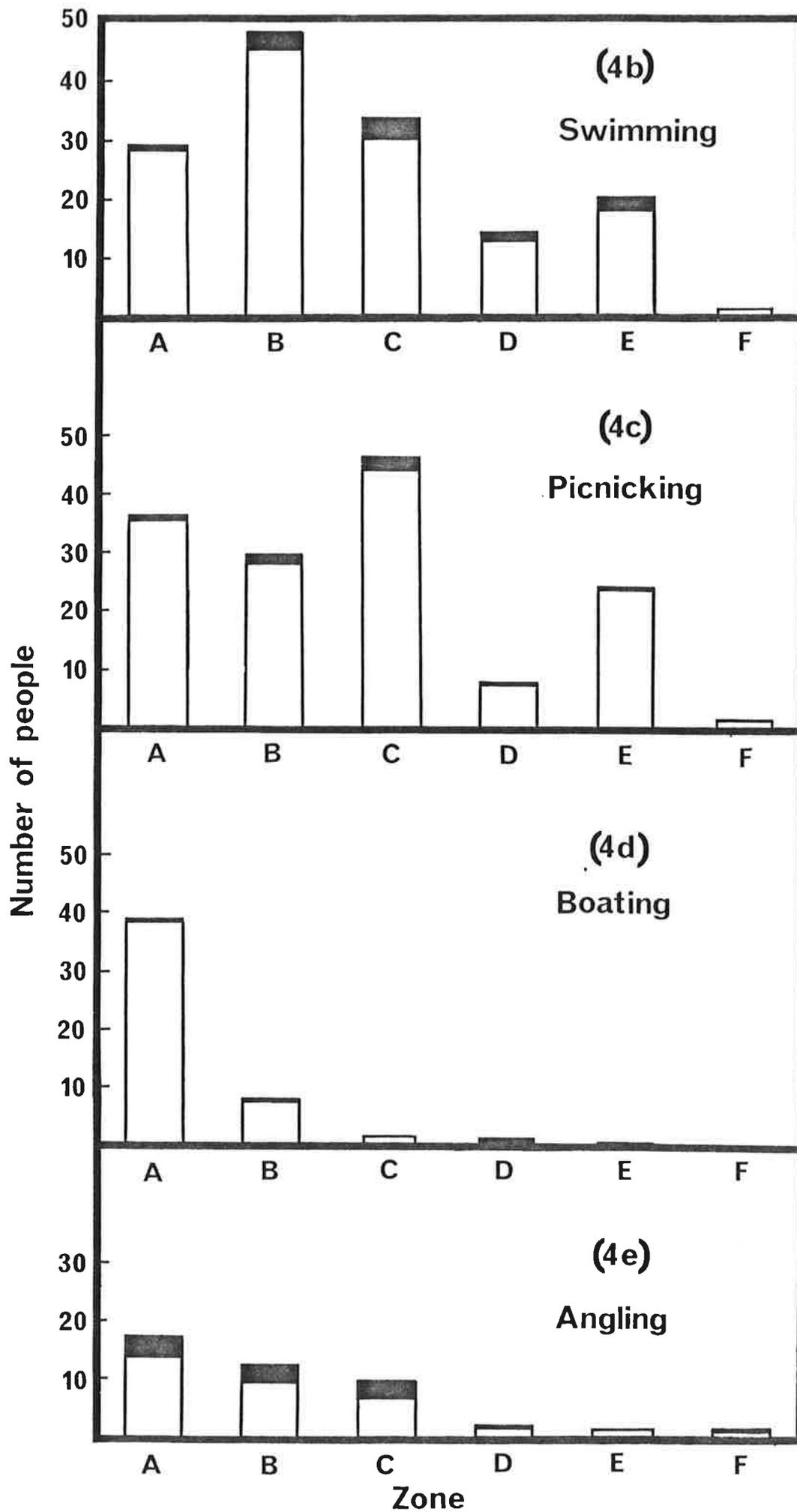
To analyse the data further, it was decided to break down the results for each zone and day type with respect to the individual activities covered by the survey i.e. swimming, picnicking, etc. To do this effectively, it was necessary to group the results for all months; without this grouping, the data would have been too fragmented to make sense. The resulting data are presented in Table 2, and are shown graphically in Figures 4a to 4e for the five most significant activities. No attempt has been made to extrapolate these results to cover the whole season - the figures quoted are averages for the days covered by the survey, and for this reason some percentages may differ slightly from those in Appendix IV. The following discussion is intended to point out the major characteristics of each zone, without making any claims to statistical accuracy.

The five activities studied in detail were swimming, picnicking, angling (for trout), boating and "onlooking". The first four of these are self-explanatory; the term "onlookers" was used to describe anyone who, in the opinion of the field officer filling in the record, was either a spectator at some organised event, or was using the river for recreational purposes but was not obviously associated with any defined activity.

##### (i) Zone A

During weekends, Zone A was very heavily utilised, accounting for 47% of all activity on the river over the survey period, with an average of 336 people on each survey day. Of these, 63.6% were classified as "onlookers", reflecting the regular use made of the estuary and tidal reaches for boating regattas. Boating was in fact the second most popular activity, representing 11.3% of the usage within the zone, followed by picnicking (10.6%), swimming (8.3%),





and angling (4.0%). Zone A was the most popular zone for boating and angling (respectively 79% and 38% of the total river use for the two activities), but was less popular for picnics and swimming (respectively 25% and 20%).

The weekday results were quite different, both in the number of persons involved and the most preferred activities. Zone A use represented 26% of the weekday total for the river (compared to 51% for weekend usage), with an average of 13 persons per day. Although "onlookers" were still the main users (42%), angling was the second most popular activity, accounting for 20% of the usage.

(ii) Zone B

Zone B was the second most heavily used, representing 21.9% of the total river usage. Weekend activities were dominated by "onlookers" (36% of the total) and swimmers (31%). Zone B was the most popular zone for swimming, accounting for 33% of all swimming on the river. Picnicking (20%), angling (7%) and boating (5%) were the only other activities in which significant numbers of people took part.

As with Zone A, weekday activities involved fewer people, with a higher proportion of swimmers and anglers. There was no significant difference in the overall number of weekday users between Zones A and B.

(iii) Zone C

Zone C had much in common with Zone B, although it was less heavily utilised (17.9% of the total river use). Picnicking (42%) and swimming (28%) made up the bulk of weekend usage. Zone C was the most popular zone for picnics, with 32% of the total river use. It was also the most popular zone during weekdays, although as with Zones A and B the actual number of persons involved was small.

(iv) Zone D

Zone D was only lightly used, representing 4.5% of the total usage. Swimming and picnicking were the major activities, together representing 77% of the activity within the zone.

(v) Zone E

Zone E showed similar characteristics to Zone D, but was rather more popular (7.6% of the total river use). Weekend activities were dominated by picnicking and swimming, which together made up 93% of the use within the zone. Very little use was recorded during weekdays.

(vi) Zone F

Zone F was very lightly used; all the main activities except boating were noted at some time during the survey but the combined usage amounted to less than 1% of the river total. By comparison, weekend usage of Zone F was less than the weekday usage of all other zones except Zone D. Nevertheless Zone F was the only zone for which angling was the major activity, and it was also the most popular zone for camping.

#### 4.2.3 Vehicle and Boat Counts

Figure 5 shows the relationship between the numbers of people and cars counted on Zone A during weekends. As might be expected there is a strong linear relation ( $r = 0.956$ ) between these two quantities, with an average of 4.4 persons per car. A similar calculation was carried out to study the relation between the numbers of boats and "onlookers"; this showed a lower but still highly significant correlation ( $r = 0.824$ ).

#### 4.2.4 Seasonal Variations

To investigate the changes in recreational use over the six months covered by the survey, the data for Zone A during weekends

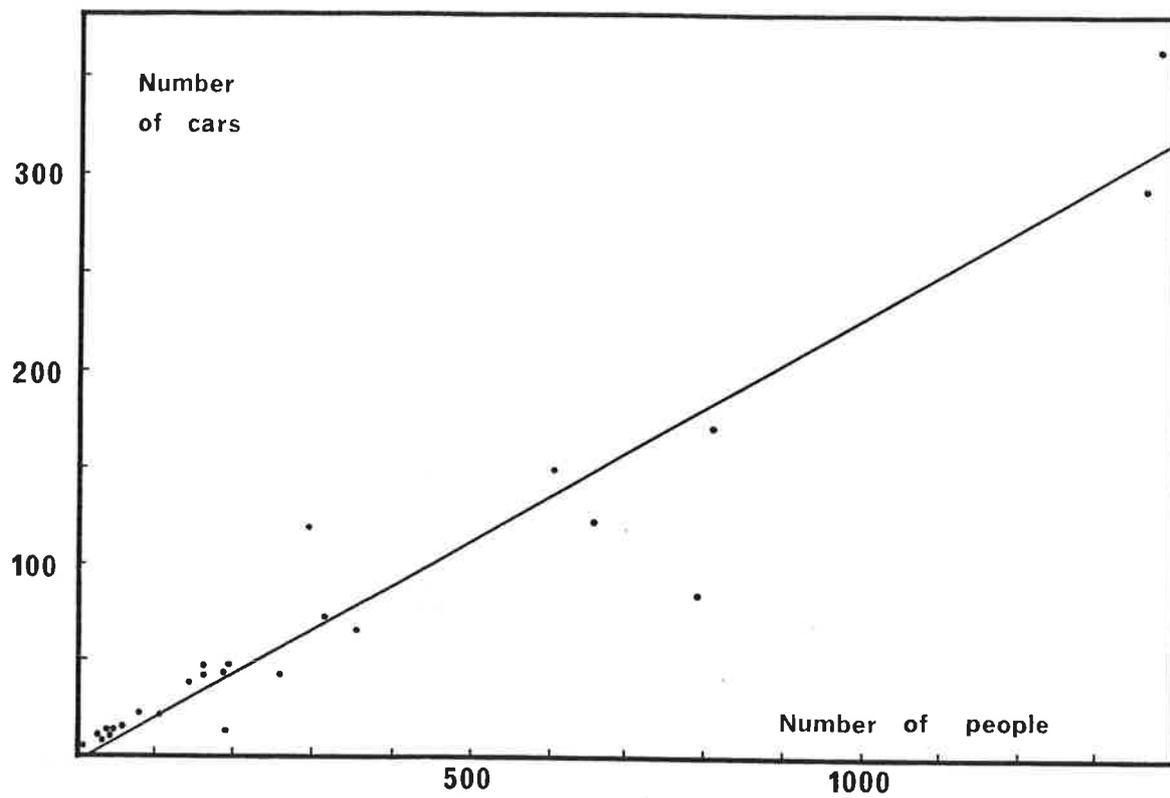


FIGURE 5. Number of people versus number of cars counted in Zone A during weekends/holidays.

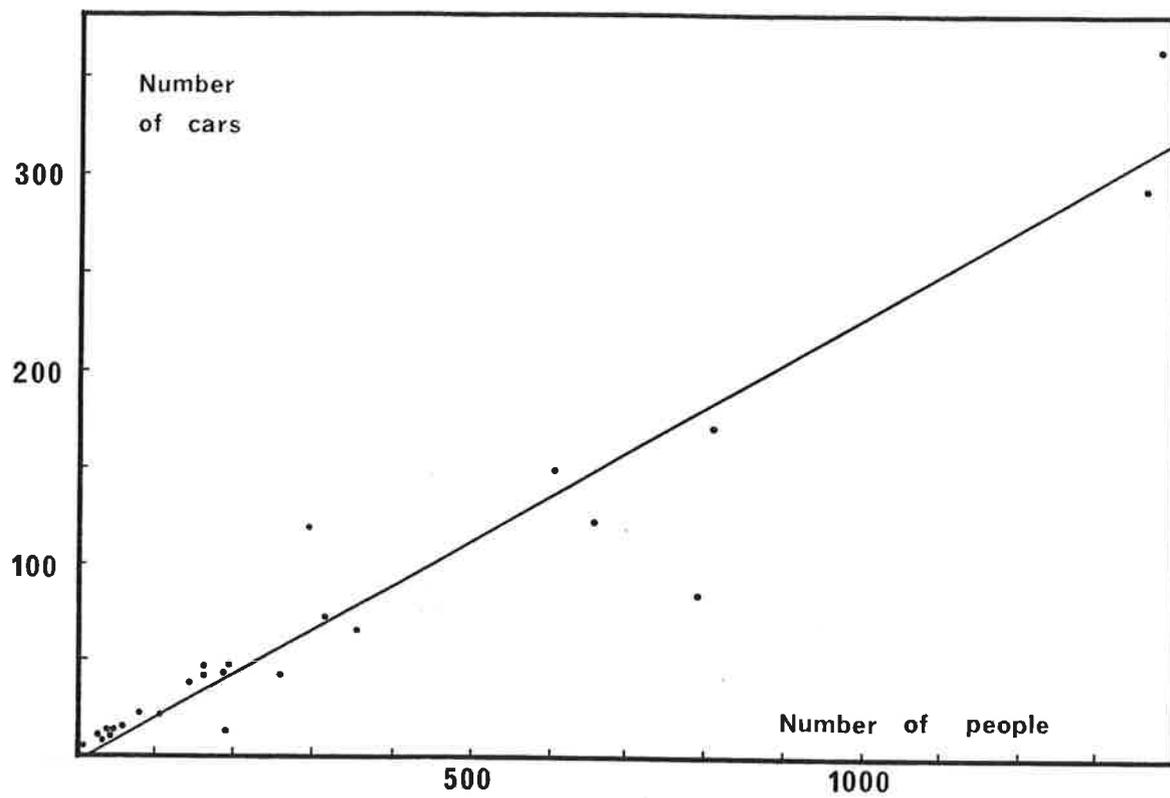


FIGURE 5. Number of people versus number of cars counted in Zone A during weekends/holidays.

were broken down further to give the average daily use for each major activity by month (Table 3).

TABLE 3. Seasonal distribution of major activities in Zone A (average daily number of persons counted at weekends for each month and activity).

	Activity				
	Onlookers	Picnics	Angling	Swimming	Boating
Nov.	288	7	26	3	61
Dec.	254	117	28	57	44
Jan.	156	36	9	18	25
Feb.	311	28	13	87	67
Mar.	295	4	13	0	36
Apr.	54	1	8	0	5

Although numbers were lower than might have been expected in January (due to a spell of poor weather), several distinct seasonal trends were apparent. Boating activities (and the associated "onlookers") were spread throughout the season, with the exception of April, while angler numbers declined steadily as the season progressed. The most highly seasonal pastimes were swimming and picnicking; for these two activities December, January and February accounted for 98% and 94% respectively of the total for the whole period.

## 5. DISCUSSION

### 5.1 Distribution of Activities

The most striking feature of the results of section 4.2.2 was

the very large number of people recorded as "onlookers" in Zone A during weekends. As has been suggested, many of these would have been associated with organised boating activities. However, there were several occasions on which large numbers of "onlookers" were noted despite minimal boating activity. It is clear, both from the raw data and from the comments of the Society Field Officers who conducted the survey, that many of the people classified as "onlookers" were part of a large group who were continually coming and going, and were not associated with any other activity. The most likely explanation for the existence of this group is that they were local Invercargill residents who were using the lower Oreti just for "getting away from it all". The very rapid decline in "onlooker" activity with increasing distance up-river supports this conclusion. The majority of persons counted above Zone A were using the river for some specific purpose.

Boating activity was also largely confined to the lower river. Zone A accounted for 79% of all boating on the river, with less than 5% recorded above Zone B. The estuary would have been the only region suitable for such pursuits as yachting, rowing and water-skiing, the remainder of the river being available mainly to jet boats - there are several jet boat rallies held annually. Boating was almost exclusively a weekend activity, weekdays accounting for only 3% of the total use.

The two most popular activities on the middle reaches of the Oreti were picnicking and swimming, which together made up 63% of the usage above Zone A. A high degree of association was evident between these two activities, and in fact the proportions of each activity falling within the six zones showed no statistically significant difference. Zone A was important for both swimming and picnicking, but it was generally less utilised than Zones B and

C. This was evidently related to the reduced water quality in the lower areas of Zone A; the majority of swimmers and picnickers were noted above the Makarewa confluence.

Zones B, C and E were all popular, Zone D being less heavily used. There is evidence that many picnickers/swimmers had travelled some distance to the river. Winton (population 2000) is located adjacent to Zones B and C, but it is likely that only a small proportion of the users came from there, especially when consideration is given to the relatively low proportion of Invercargill residents who used Zone A for picnicking/swimming. Most persons counted in Zones B and C had probably travelled from Invercargill.

The relatively high usage of Zone E for picnicking/swimming is interesting in relation to the above comments. Although the towns of Lumsden and Mossburn lie within this zone, local people probably account for only a small proportion of the total use. A major factor contributing to Zone E usage could well be its location on the road to/from Te Anau and Milford Sound - for travellers from Queenstown, Dunedin, Gore or Invercargill this area represents a pleasant and convenient intermediate stopping point. It thus seems likely that Zone E attracts many people travelling from outside the immediate area.

Angling, although representing only 6.6% of the total use, had its own distinctive pattern of activity along the river. Usage decreased steadily upstream; Zones A, B and C representing 37%, 28% and 21% of all angling on the river. There was no evidence to suggest that angling was closely associated with any other particular activity, the main factor influencing angler distribution apparently being the distance from Invercargill. This was borne out by the relatively high angling pressure on Zone A - despite the inferior water quality, there is still adequate fishing to be had for those with limited time or means of travel.

Those anglers who fished further upstream were probably attracted for a variety of reasons. Angling quality is highest in the upper reaches (particularly Zone F), where in addition to larger fish (see Appendix III), there is a wilderness atmosphere not found lower down the river. A significant point is that angling showed by far the highest proportion of weekday activity, further emphasising its independence from any other activity.

The relation between vehicle numbers and persons counted appears to be highly significant, even though not all users (especially in Zone A) would have reached the river by car. The average figure of over four persons per car (which applies to all zones except F) seems remarkably high, and suggests that a large proportion of the total usage is made up of family groups. This figure applies to weekends only; during weekdays the average drops to just over three persons per car, which (although still quite high) is consistent with a reduced proportion of family groups.

A final comment in relation to these data is that the strongly linear relationship between vehicle numbers and user numbers suggests that a rough estimate of user numbers could be obtained simply by counting cars and multiplying by the appropriate factor. In practice, this would require some detailed preliminary counts to establish the ratio of users to cars; once this figure was obtained relatively little extra work would be necessary. The disadvantage of such a survey would of course be the lack of information gathered which related to specific activities.

## 5.2 Other Activities

Because of staff and time limitations, it was not possible to extend the survey beyond the six months actually covered. Consequently, several activities of a highly seasonal nature were not included,

although it was realised that they would have attracted significant numbers of people. Among these were:

- (i) whitebaiting (September - November)
- (ii) early season trout fishing (October, particularly opening weekend)
- (iii) duck shooting (May - June).

Whitebaiting takes place throughout the tidal reaches extending up all the tidal creeks as well as the Oreti itself. Activity is mainly concentrated in September and October. At such times Society Field Officers have counted over 50 nets in use at one time. A total of 18 whitebaiters was counted during the last half of November, but this is considered to represent only a small fraction of the total use. Likewise it is not known what proportion of the total angling effort would have been missed during October; the period immediately after opening weekend is generally regarded as the most popular.

No data are available on duck-shooting activity on the Oreti. The following comments, supplied by Society rangers who know the area well, reflect the popularity of the Oreti for duck shooting:

"During May and early June, duck shooting is a major activity, much of the river being used for the purpose. Such use is particularly heavy in Zone A, where a minimum of 150 shooters are known to operate annually. With the possible exception of the upper part of Zone F, all other zones support a significant and fairly uniform level of duck shooting use.

There were 3,988 game shooting licences sold for the 1974/75 season. Duck shooting on the Oreti and immediately adjacent waters would promote a significant percentage of these licence sales."

Several other activities were considered during the survey, but were not recorded frequently enough to justify detailed analysis. Persons fishing for species other than trout (i.e. native species) were almost entirely confined to Zone A. In addition to whitebait, eels and flounder were taken from time to time, seine nets being used for the latter. There is also spear fishing for flounder (using spotlights) as far up as the S.H.99 bridge - this was of course not included by the survey as it takes place at night. The river is used by canoists, although it is not known as a white water river; its main value is as an easy training ground for beginners. The upper reaches (Zones E and F) are canoed only during high flow (Egarr and Egarr 1978).

Also noted during the survey, but not mentioned elsewhere in this report, were horse-riding, walking, training of dogs and collecting firewood.

### 5.3 Present Day Use

While it is unlikely that any major changes in the pattern of recreational use on the Oreti, as outlined above, have taken place since the survey was conducted, several factors are likely to have an increasing effect in the future. The most obvious change in recent years is the current fuel situation, with high prices and restrictions on weekend sales. For Invercargill residents, most of the Oreti lies within the range of a car with a full tank of petrol, but rising fuel costs are likely to concentrate usage around the main population centres. All of Zone A is within easy cycling distance of the main population centres and is in future likely to receive an even higher proportion of the total use than it did in 1974/75. Increased usage of Zone A would probably occur at the expense of those zones further up the river, with Zone E perhaps being the most strongly affected.

Annual variations in weather conditions will affect the overall usage during a particular season. A case in point is the low use noted during January 1975, when there was a spell of poor weather. Apart from the obvious conclusion that most recreational use (particularly swimming and picnicking) took place during times of fine weather and stable river conditions, little information was gained from the weather records taken during the survey; the 1974/75 season seems to have been "average". The high use of Zone A is perhaps all the more remarkable considering that weather in the Southland coastal zone is markedly poorer than it is further inland.

Over the period 1975-1979 there has been a slight increase in the population of Invercargill and the surrounding districts, and a rather more pronounced rise in fishing licence sales (Table 4). The 1979 fishing licence sales show a marked increase over previous years, although it is not possible to say whether this is part of a definite trend. However, there is little doubt that recreational pressure on the Oreti will steadily increase as the Southland population increases.

TABLE 4. Southland population and Southland Acclimatisation Society fishing and game licence sales, 1975 - 1979.

	Population		Licence Sales	
	Invercargill City	Southland County	Adult Fishing	Game
1979	53 800	26 100	6808	3728
1978	54 000	26 300	5695	3964
1977	53 900	25 800	5744	3727
1976	53 762	25 922	5447	3835
1975	50 600	26 190	5215	3988

## 6. CONCLUSIONS

1. Over the period November 1974 to April 1975, all reaches of the Oreti River were used for recreational purposes.
2. The most popular recreational activities were "onlooking", swimming, picnicking, boating and angling.
3. Below the S.H.99 bridge, a large number of recreational users were classified as "onlookers". Some of these were spectators at boating regattas, but many did not appear to be associated with any organised activity.
4. In the middle reaches of the Oreti, swimming and picnicking were the most popular activities, particularly near minor population centres.
5. The most popular areas above the estuary and lower reaches were from S.H.99 to Dipton, and Lumsden to Mossburn (Zones B, C and D). Usage of these areas apparently included both local residents and families travelling from outside the immediate area.
6. Recreational usage was heaviest during weekends and holidays.
7. Angling made up 6.6% of the total use, and was concentrated on the lower half of the river.
8. Picnicking and swimming were heavily concentrated over the period December-February; other activities were recorded throughout the season.
9. The current fuel situation is likely to further concentrate usage around existing population centres.

## 7. ACKNOWLEDGEMENTS

The author wishes to thank Mr Roger Sutton of the Southland Acclimatisation Society for his help in preparing this report. A special note of gratitude is due to Mr N.A. McMillan and the staff of the Southland Catchment Board, who provided a wealth of background information on the Oreti River. Thanks are also due to colleagues at FRD in Christchurch for editorial assistance.

## 8. LITERATURE CITED

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APPENDIX I. THE RECREATIONAL SURVEY RECORDING FORM.

SOUTHLAND ACCLIMATISATION SOCIETY RECREATIONAL ACTIVITY SURVEY											
SURVEY WATER					ZONE	A	B	C	D	E	F
DATE	D			Y			DAY		WEEKDAY	HOLIDAY	WEEKEND
TIME	AM	AM	PM	PM			DIRECTION		UPRIVER	DOWNRIVER	
					M	W	J	UN	TOTAL		
ANGLING (AC)											
FISHING (N)											
ONLOOKERS											
BOATING											
SWIMMING											
PICNICKING											
WALKING											
GRAND TOTAL											
RIVER CONDITIONS	FLOOD		FRESH		NORMAL		LOW				
	DIRTY		COLOURED		CLEAR						
COMMENTS											
OBSERVER											

CARS	
CARAVANS	
BOATS	
CAMPS	
WEATHER	
FINE	HOT
CLOUDY	AV
O'CAST	COLD
RAIN	SW
WINDY	SE
BREEZE	NW
CALM	NE

## APPENDIX II. THE ORETI ANGLER SURVEY 1974/75.

The results presented in this Appendix are based on data gathered during interviews with 53 anglers, carried out during the 1974/75 recreational survey. No attempt was made to question a random sample of anglers, or to sample the zones evenly, with the result that some zones were under-represented (Zone B accounted for over half the anglers spoken to). Because of the low sample sizes, detailed analysis of the data would be pointless; these results are intended as a qualitative assessment only.

### Catch Rate

A total of 38 takeable trout were landed in 151 hours, giving an average of 0.25 fish per hour. Catch rates ranging from 0.38 to 1.3 were reported by Graynoth and Skrzynski (1974).

### Fishing Methods

There was considerable variation in the preferred fishing methods at various points along the river. In Zone A, all seven anglers questioned were using live bait (worms or smelt). Worms were the most popular bait in Zone B (being used by over half the anglers), but artificial minnows were also widely used. Few anglers above Zone B used live bait. Artificial minnows, dry and wet flies were used by 13 out of 15 anglers in Zones C, D and E. Only four anglers were questioned in Zone F, and all of these were using dry flies.

### Origin of Licence

Forty-five of the anglers interviewed had licences purchased within the Southland Acclimatisation District, of which 34 were from Invercargill. Eight licence holders from outside Southland were noted, from Otago, Canterbury and Auckland.

APPENDIX III. THE LENGTH DISTRIBUTION OF ANGLER CAUGHT TROUT IN THE ORETI.

The following results, concerning the size of brown trout caught in various reaches of the Oreti River, were based on data from the personal angling records of Mr C.W. Williams of 236 Lamond Street, Invercargill. These records, covering the period 1958-1975, were made available to the Society in the hope that they would be of some use in analysing the results of the recreational survey. However, because of the low emphasis placed on interviewing anglers during the survey, few comparable data were obtained. Consequently, these records are of considerable interest as they stand, providing data on 139 trout taken from all sections of the Oreti.

For the purpose of analysis, the data were grouped into four areas. These were:

- Zone A : Below S.H.99 bridge (Taramoa, Wilson Creek)
- Zones B-C : S.H.99 to Dipton (Oporo, Centre Bush, Benmore, Dipton)
- Zones D-E : Dipton to Lumsden (Caroline, Josephville, Lumsden)
- Zone F : Mossburn and above (Mossburn, Rocky Point, Centre Hill).

The length distributions for trout taken in each of these four areas are shown in Figure 6, where significant differences between the zones are apparent. The dominant trend is a steady increase in mean length with increasing distance up river, from S.H.99 to the headwaters. No fish above 40 cm in length were taken between S.H.99 and Dipton, whereas from Dipton to Lumsden over half the fish landed exceeded 40 cm. Out of seven fish caught in Zone F, one was under 45 cm. Zone A did not conform to the above pattern; although it contained many small fish (< 35 cm), half of the fish taken were medium size fish in the 40 - 50 cm range.

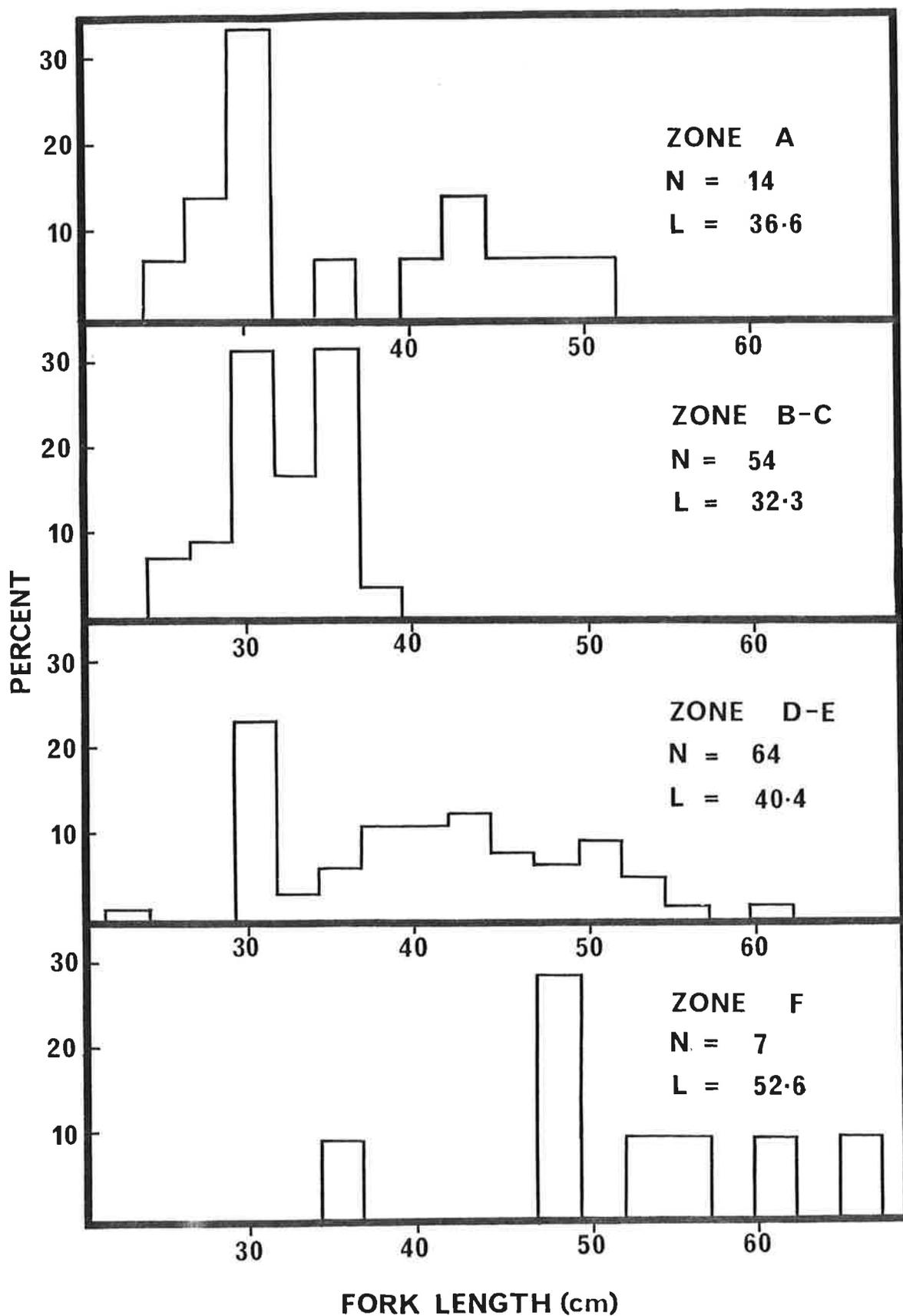


FIGURE 6. Length frequencies of trout caught in different zones of the Oreti River.

These results are interesting when compared with the work of Boud and Eldon (1959) and Boud (1962). They report that small fish (one to two years old and up to 35 cm in length) were very common in the "middle reaches", larger fish apparently being confined to the headwaters. The above results are consistent with this, and may indicate that there is a gradual upstream movement of older and larger fish, which presumably spawn in the upper reaches. The presence of larger fish in Zone A suggests that some trout may live there as residents, but it is also possible that sea-run fish were being caught. (In November 1979, a trout tagged during the 1974/75 survey was caught in Foveaux Strait near Green Islets, 95 km west of Invercargill. The original tag record is, unfortunately, unavailable.)

APPENDIX IV. SUMMARY OF THE 1974/75 RECREATIONAL SURVEY DATA.

The following report has been adapted from the Southland Acclimatisation Society's Annual Report for 1975. Apart from some minor editorial changes, the text has not been altered, although some paragraphs have been deleted to avoid repetition of material elsewhere in the main report.

For the purpose of this survey a person (whether man, woman, or child) was designated as a Recreational Day Unit (R.D.U.). The data were split into two groups:

- (i) non-water users
- (ii) water users.

A non-water user was defined as a R.D.U. whose activity at the time of the survey was not directly involved with water (e.g. walking, picnicking, horse riding, onlookers). However, it must be emphasised that the water does contribute to their carrying out the recreational activity in such a location.

A water user is defined as a R.D.U. whose activity, at the time of the survey, was directly involved with water usage (e.g. swimming, boating, fishing, water skiing, etc.).

The above two groups were further sub-divided into weekend/holiday and weekday periods.

There was a total of 51 survey days during the six month period November 1974 to April 1975. For these days a total of 12,731 R.D.U.'s were recorded.

The data were extrapolated to cover the total of 181 days in the six month period. These data are shown in Table 5, from which the following main points emerge:

TABLE 5. Estimated total recreational day units (R.D.U.'s) by month and zone. (Reproduced from Southland Acclimatisation Society Annual Report 1975.)

	A				B				C				D				E				F			
	Water		Non Water		Water		Non Water		Water		Non Water		Water		Non Water		Water		Non Water		Water		Non Water	
	week	w/end	week	w/end																				
<b>NOV. Total R.D.U.</b>	84	891	63	2637	105	342	21	387	—	180	—	756	21	189	—	36	21	171	105	378	21	—	—	—
<b>Zone Total</b>	3675				855				936				246				675		100%		21			
<b>% of Zone</b>	2%	24%	2%	72%	12%	40%	3%	45%	—	19%	—	81%	9%	77%	—	14%	3%	25%	16%	56%	100%	—	—	—
<b>% Fishing</b>	1%	3%			2%	5%			—	3%			4%	—			—	—			52%	—		
<b>DEC. Total R.D.U.</b>	240	1441	300	3520	300	385	100	1342	140	726	400	902	—	187	20	176	100	715	60	682	—	11	—	22
<b>Zone Total</b>	5501				2127				2168				383				1557		—		33			
<b>% of Zone</b>	4%	26%	5%	64%	14%	18%	5%	63%	6%	33%	18%	42%	—	49%	5%	46%	6%	46%	4%	44%	—	33%	—	67%
<b>% Fishing</b>	0.02%	0.02%			0.01%	1.73%			0.01%	0.02%			—	5.7%			1.28%	0.2%			—	33%	—	
<b>JAN. Total R.D.U.</b>	198	649	198	1818	66	1359	22	1260	264	117	88	351	—	171	—	153	66	108	176	90	—	27	—	27
<b>Zone Total</b>	2763				2707				820				324				440		—		54			
<b>% of Zone</b>	7%	20%	7%	66%	2%	50%	1%	47%	32%	14%	11%	43%	—	53%	—	47%	15%	25%	40%	20%	—	50%	—	50%
<b>% Fishing</b>	0.02%	1.59%			0.33%	2.36%			9.03%	—			—	2.77%			—	0.4%			—	33%	—	
<b>FEB. Total R.D.U.</b>	95	1548	114	3078	—	963	—	2583	—	126	—	54	114	135	38	180	—	117	19	297	—	—	—	—
<b>Zone Total</b>	4835				3546				180				467				433		—		—			
<b>% of Zone</b>	2%	32%	2%	64%	—	27%	—	73%	—	70%	—	30%	24%	29%	8%	39%	—	27%	4%	69%	—	—	—	—
<b>% Fishing</b>	1.22%	0.7%			—	0.1%			—	—			2.14%	—			—	—	—	—	—	—	—	—
<b>MAR. Total R.D.U.</b>	40	561	40	3355	40	121	—	176	—	66	—	165	—	55	—	—	20	—	—	22	—	22	—	165
<b>Zone Total</b>	3996				337				231				55				42		—		187			
<b>% of Zone</b>	1%	14%	1%	84%	12%	36%	—	52%	—	29%	—	71%	—	100%	—	—	48%	—	—	52%	—	12%	—	88%
<b>% Fishing</b>	0.3%	2.3%			10.9%	14.2%			—	5.19%			—	21.8%			23.8%	—	—	—	12.8%	—	—	—
<b>APR. Total R.D.U.</b>	66	112	22	440	22	192	—	232	—	—	—	—	—	—	—	—	22	16	—	8	—	—	—	—
<b>Zone Total</b>	640				446				—				—				46		—		—			
<b>% of Zone</b>	10%	18%	3%	69%	5%	43%	—	52%	—	—	—	—	—	—	—	—	48%	35%	—	17%	—	—	—	—
<b>% Fishing</b>	3.47%	7.03%			1.56%	5.38%			—	—			—	—			23.9%	17.3%			—	—	—	—

- (1) There was a total of 40,726 R.D.U.'s during the six months.
- This comprised:
- for non-water use - 27,078 (66.5%) R.D.U.'s
- for water use - 13,648 (33.5%) R.D.U.'s.
- (2) Most activity was carried out during weekend/holiday periods:
- for non-water use - 25,296 (62.1%) R.D.U.'s
- for water use - 11,603 (28.5%) R.D.U.'s.
- (3) Weekday activity comprised:
- for non-water use - 1,786 (4.3%) R.D.U.'s
- for water use - 2,045 (5.0%) R.D.U.'s.
- (4) The most active months were December 1974 and February 1975, taking 10.4% and 6.5% respectively of the total R.D.U.'s for weekend, weekday water users and 18.5% and 15.6% respectively for weekend, weekday non-water users.
- (5) Zone A - the estuary and river mouth to the bridge on State Highway 99 (Wallacetown) - was the most used section, comprising 21,410 R.D.U.'s (52.5% of the total activity).
- Non-water use - 15,585 (38.3%) R.D.U.'s.
- Water use - 5,825 (14.3%) R.D.U.'s.
- (6) Zone F was the least utilised. This was evident despite the fact that very few survey days were allocated to this region.
- (7) Angler activity made up approximately 5% of the total recreational activity. More information will be available when the fishing survey forms are analysed.

As can be seen from the above analysis, intensity of activity appears to be directly related to centres of population. Zone A was the most extensively used section of the river in spite of the fact that water quality here is not as attractive as in the lesser used sections upstream.

The survey only recorded activity actually seen during the period of observation. For example, almost 1,400 people were recorded on Zone A during a three hour period on a Sunday afternoon. Obviously, considerably more people used the river at other times during that day.