A RECREATIONAL GEOGRAPHY OF THE AVON-HEATHCOTE ESTUARY, CHRISTCHURCH

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by

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TO MY FATHER,

his companionship, understanding
and blithness of spirit an
example to me always

R.I.P.

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ABSTRACT

This thesis examines the recreational use of a multi-functional resource, the Avon-Heathcote Estuary. The nature of resources suitable for outdoor recreation in the Christchurch area and the present use made of them are explored through a demand-supply framework. Although exploratory, the research into recreational use of an estuarine environment advocates the need for a greater understanding of resource capabilities and use requirements. To this end, a framework which examines both user and resource is described.

Recreation resources within the study area are identified and examined with respect to quantity, quality and distribution. Recreational demand is analysed in terms of measures of recreationalists' attitudes preferences and activities. The diversity of functions provided by the Avon-Heathcote Estuary means that recreation must be considered in relation to other uses. In view of the expected growth in recreational use of the Estuary the notion of carrying capacity is introduced. The capacity concept is discussed within the wider context of maintaining user satisfaction and conserving the estuarine environment.

CHAPTER 1: THE RESEARCH SETTING

1.1 WHY RECREATION RESEARCH?

> "It must be one of our primary objectives to ensure that a proper balance is maintained between providing for recreation, and the protection of resources, lest we allow to be destroyed that which we seek to enjoy"
>
> Lothian Regional Council, Department of Recreation and Leisure, 'Countryside Recreation in the Lothian region'. February 1976

Growth of leisure, as expressed in demand for recreation, is one of the most dynamic forces of our time. Many factors have led to this rising demand for recreation; the time and opportunity available has grown considerably, with a shorter working day and week, paid holidays and labour saving devices. The rapid diffusion of car ownership has provided greater personal mobility. The growth in disposable income has also encouraged expenditure on recreation and leisure, and educational changes have encouraged greater numbers to participate in a wide range of activities. The Outdoor Recreation Resource Review Commission (O.R.R.R.C.) in a study report entitled 'Outdoor Recreation in America' (1962) concluded that growth of outdoor recreation would accelerate, even faster, than net increase in population. By the time the United States population doubled around the year 2000 it was predicted that demand for recreation would have tripled. Overseas experience suggests that New Zealand is now feeling the impact of an intensified and sustained demand for recreational facilities.

Faced with this situation, local planning authorities and other agencies concerned with use of land and water

resources must ensure that development of such facilities does not conflict with the essential need for conservation of natural environments. It is around such a conservation-development equation that this thesis is organised.

1.2 THE NEED FOR RECREATIONAL PLANNING

In recent times the increasing magnitude and complexity of recreation and environmental demands and problems have accentuated the need for planning the use of land and water resources. That resources are finite and that features of high outdoor recreation value are relatively scarce is now widely recognised. Competition for resources between industry, urban requirements and agriculture continues to result in land being committed to particular uses thereby frequently excluding other uses and closing off options for the future (Marlborough Pilot Study, 1977). Among those diverse and potentially conflicting demands, outdoor recreation needs a sound and broad planning base so that it receives adequate consideration as a key use in the allocation of New Zealand's resources. This is consistent with conditions set down in the 1967 WATER AND SOIL CONSERVATION ACT in which recreation is included as a primary factor in multi-use resource planning. However to introduce recreation as a major variable in resource use requires planning information and new attitudes to resource use.

The quality and diversity of recreation available has been of great social value to all New Zealanders (Thom, 1970). In its report to the National Development Conference the Social and Cultural Committee (New Zealand National Development Conference, 1969) noted the importance of choice in recreation. A primary contribution to "quality

of life" in New Zealand has been the range and available choice of outdoor recreational activities. This range of choice is related not only to a small population but also to a stage of economic development. Thom (1970) argues that an expanding population will lead to restrictions in choice. In the face of expected growth in New Zealand's population in the long term and the concomitant increase in urbanisation and industrialisation, recreation must now be considered as one of the primary factors in resource planning. To this end survey information on needs and resources of all forms of outdoor recreation is urgently required. The present study concentrates on one aspect of outdoor recreation, namely recreational use of a specific coastal zone.

1.3 RECREATIONAL USE OF THE COASTAL ZONE

The coastal zone, defined as those areas of adjoining land and sea in which both elements are related physically, visually and through human activity, is one of New Zealand's most valued and most valuable natural resources. New Zealand by virtue of its 11,500 kilometres of coastline and a high ratio of coastal to inland area is generously endowed with coastal resources. As such we are well placed to exploit and abuse or manage wisely and conserve the land-sea interface. Most of our major cities and industrial complexes are situated near the sea and hence visits to the coast for recreation feature strongly in the lives of most New Zealanders. The interface between land and sea is a unique resource and is now coming under increasing pressure in response to man's changing needs. It is not surprising, therefore, that, as in developed countries overseas, many parts of coastal New Zealand are being subjected to conflicting

pressures in the context of resource management.

Recreation is undoubtedly one of the largest and fastest growing uses of the coastal zone (Lucas 1977). The findings of the Outdoor Recreation Resource Review Commission (1962 a,b,c,) emphasised the dominance of water based recreation in preferences for outdoor activities of Americans. Several British authors notably Patmore (1972) and Cosgrave and Jackson (1972) argue that the coastline is, and probably will continue to remain, the main national playground in the United Kingdom. A great deal of work has been carried out on recreational use of the British coastline. Since the 1960's most of this research has been undertaken by the Countryside Commission. The Commission has generated numerous reports devoted to clarifying problems facing coastal recreation and identifying certain principles to planning and preserving sectors of the coastline. Especially relevant to this study is their literature dealing with recreation and coastal management (Countryside Commission 1969, 1970 a & b).

The situation regarding research in Australia and New Zealand is somewhat barren compared with that in the Northern Hemisphere. Only now is some form of resource management policy being formulated and applied. As increased pressures have been brought to bear on National Parks and coastlines especially, New Zealand and Australia are following overseas precedents and research is now being carried out to determine trends in use of our leisure time.

Mercer's discussion of coastal recreation emphasises the significance of the coast in the Australian context:

> Without doubt the coastline can lay just claim to being the most important and most vulnerable recreational environment. It is along the coast that the problems of planning for present and future outdoor recreation are thrown into the sharpest relief. (Mercer 1972 pg. 1)

Within New Zealand Cranwell (1968) Hughes (1973) Yong (1974) and Young (1977) have made significant contributions to management of coastal resources for recreation. The efforts of various government departments such as the Ministry of Works (Coastal Development 1972, Banks Peninsula Recreation Survey 1977) and the Department of Lands and Survey (Marlborough Pilot Study 1977, Wellington Regional Recreational Survey 1974) indicate a growing awareness of the need for regional research in providing a basis for recreational planning and management. Results of investigations undertaken by local authorities especially in Auckland (Auckland Regional Authority 1971, 1973) and in other main centres illustrate the popularity of water related recreation activities. Table 1 in Appendix 1 shows a summary of recent surveys in New Zealand and their major findings.

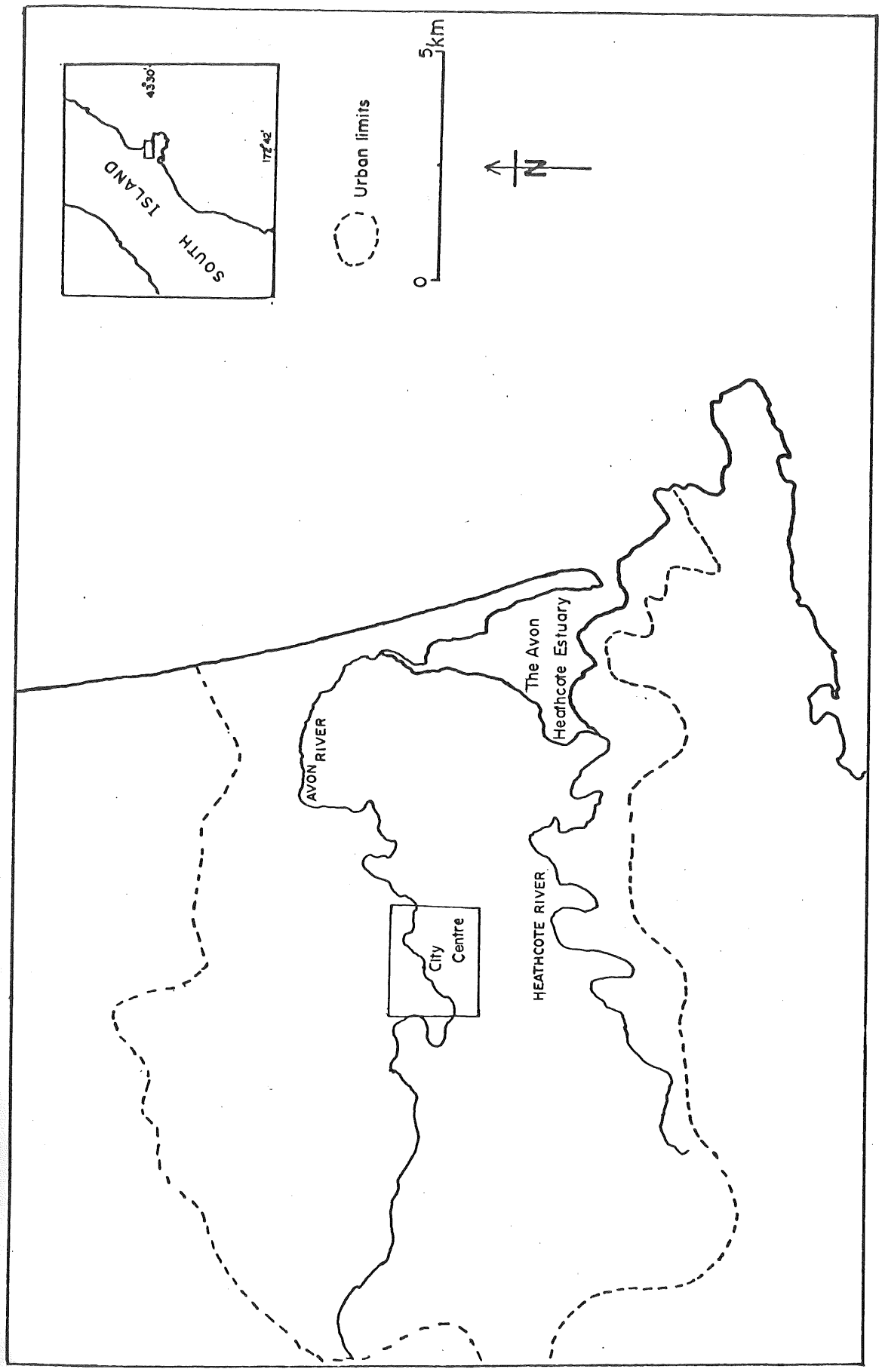
1.4 THE CHOICE OF AREA

The 1970's have seen a considerable upsurge of interest in environmental issues and concern with maintenance of quality of life in New Zealand. Significant changes in the administration and organisation of government departments and agencies concerned with management of our resources have reflected increasing awareness of the importance of environmental issues. While establishment of the Environmental Council was a direct consequence of the 1970 Physical Environment Conference, subsequent appointment of a Minister for the Environment in 1972 and establishment of a Commission for the Environment demonstrated political awareness and commitment towards the better understanding of resource conservation and management. Other important developments have been establishment of a Ministry of Energy Resources and a

Commission for the Future. Existing departments including the Ministry of Works and Development, the New Zealand Forest Service and the Department of Health have been re-organised to permit a more direct focus on environmental subjects. These innovations have been accompanied by the introduction of new administrative procedures that have allowed important changes in approach to the problems of environmental management. Perhaps the most far-reaching has been the introduction of environmental impact reporting and auditing procedures administered by the Commission for the Environment.

Within the community a strong public awareness of environmental issues has developed as is evidenced by responses given to Save Manapouri Campaign, Campaign Half Million and more recently the Clutha Valley Hydro-development scheme. The "Environment 77" Conference is of course a clear indicator of many aspects of the developing and strengthening of community awareness of environmental issues and of citizens organisations within the community. In Christchurch a manifestation of increased environmental consciousness has taken the form of public concern for what was felt to be the worsening condition of the Avon Heathcote Estuary. The Avon Heathcote Estuary is a small shallow, largely intertidal estuary located on the fringe of Christchurch city on the east coast of the South Island, New Zealand (Figure 1). The Avon Heathcote Estuary or 'The Estuary' as it will be called consists of approximately 716 h.a (1770 acres) of tidal mud flats in the shape of an equilateral triangle with the Avon River entering in the northern corner and the Heathcote entering in the southwest. The centre of the city of Christchurch stands 6.5 kilometres to the west. Both

Figure 1: Location of the Avon-Heathcote Estuary



the sandspit on the eastern flank and the hills to the south are residential suburbs of the city. The land to the immediate west largely remains undeveloped. The recreational resource was defined as The Estuary including all adjacent lands and a number of reserves, parks, conservation areas and public and private facilities.

In March 1968 concern for deterioration of the Estuary prompted the Christchurch Drainage Board to request the Zoology Department at Canterbury University to undertake research on the problem of sea-lettuce and its possible control. In 1970 the Drainage Board provided further grants to enable expansion of the research programme to study the effects effluent discharge was having on nutrient content of the Estuary. The scope of the investigation was wide ranging, covering not only biological aspects but also hydrology, chemistry and resource evaluation. Included in this was a discussion on recreational use. A conclusion of the report was that insufficient knowledge was available on recreational use characteristics of the Estuary and that basic data on recreational needs, values and uses would be required for the development of a management plan:

> .....unfortunately we do not have any available surveys of current levels of recreational use of the Estuary and even less is known of the future demand.....there is an urgent requirement for an in depth study of present and future patterns of demand for recreation. It is only then that we will have a firm basis for management as far as this aspect of resource use is concerned.

The need for research into aspects of recreation in this area is even more obvious when it is realised that the Estuary is particularly vulnerable to increased demands because of its location and the nature of its resources.

Studies in recreation demand have identified a number of trends among which can be listed demand in urban areas for recreation in natural or semi-natural settings, attraction of water orientated activities, and the great demand for recreation for activities close to home. Survey results both in New Zealand and overseas suggest that there is a need for protection and rational development of recreation space within the urban periphery (Bowen 1974, Wagar 1967, Galletly 1972, Henderson and Stagpole 1974). Furthermore, the rising cost of future recreational travel may have important implications for recreational use of the Estuary. Duffell (1975) postulates that in times of fuel cost inflation pleasure motoring is the most expendable item in car travel. Whether a reduction in pleasure driving would result in motorists making few longer trips is unclear. If the latter occurs fuel cost increases will have serious implications for recreation planning on the urban fringe.

Finally the author believes that the Estuary has reached a crucial stage in its history. As Christchurch continues to grow, greater pressure will be placed on the Estuary to fulfil its function as a resource with multiple use. Recreational use of the area is expected to increase largely because advantages of accessibility to a large urban population and potential to satisfy a wide range of activities magnify its attraction as a recreational resource. In order to preserve the estuarine environment management plans will need to restrict use to levels which are compatible with conservation of those features of the environment which are unique.

1.5 SCOPE OF THESIS

To the author's knowledge no previous studies dealing with recreational use of the Avon-Heathcote Estuary have been

undertaken. This present research is essentially exploratory and therefore does not claim to provide a complete coverage on all aspects of recreation. The primary aim of the thesis is to provide basic information on recreational resources of the Avon-Heathcote Estuary and the current demands placed upon these. Within this larger aim are several subsidiary aims which should be made clear at the outset as these determined the scope of the investigation and the manner in which the research was arranged. The following subsidiary aims were defined:

1) To employ a combination of techniques to gain information on recreationalists using the Avon Heathcote Estuary.
2) To give equal consideration to both supply and demand aspects of recreation at the Estuary.
3) To consider the implications of increased recreational use of the Avon Heathcote Estuary on both users and resource.

The validity of trends and patterns identified in the study could be questioned on two counts: the short time span for which the study was run and the relatively small number of people interviewed. The considerable time required for on-site interviewing limited the number and extent of population surveyed. Despite these drawbacks it is maintained that the findings adequately describe the broad recreational use patterns at the Estuary in the late 1970's.

CHAPTER 2: CONCEPTUAL FRAMEWORK

Since the mid 1960's environmentally orientated geographical research has been influenced by two main trends.[1] One is the rise in popularity of General System Theory. The possibility of applying concepts and generalisations to a wide range of interdisciplinary phenomena had much appeal. The other is the growing acceptance of the ecosystem concept, that is the adoption of evolving biological concepts to the study of man-environment relationships.

2.1 AN ECOLOGICAL APPROACH TO RECREATIONAL RESEARCH

Growing public and scholarly concern about the protection of environments that have not been unduly modified by man is one explanation for the increasing stress some geographers and many ecologists have placed on an ecological approach to landscape management and planning. In its simplest form the ecological approach suggests that information on natural history and character of a landscape should be employed in planning for use of land and water resources. In its more sophisticated sense it can be considered as synonymous with the 'ecosystem approach', an ecosystem having been defined as a functioning, interacting system composed of one or more organisms and their effective environment both physical and biological (Stoddart 1965, Fosberg, 1963). Among other things, the description of an ecosystem may include its spatial relations, inventories of its physical features, its habitats, its organisms, its basic reserves of matter and energy and the patterns of circulation of matter and energy.

1 Useful reviews of early 20th century man-environment debates can be found in Grossman(1977) and Lewthwaite (1966)

In other words the employment of ecological principles in resource planning requires considerable information about all elements of the landscape and the interactions or inter-relatedness among them. The emphasis is on viewing part or all of a landscape or environment as a system or part of a system and on understanding the way the system works. With such an understanding, the recreational planner and decision maker would be well placed to ensure exclusion of those activities which threaten to bring about undesirable changes to our land and water resources.

A fairly wide range of geographical studies would be cited as illustrating an ecological approach in the broad sense of the word. Relevant research has been carried out in Banf National Park, Canada, where a scenic highway programme was proposed to meet the needs of increasing numbers of recreationalists and tourists and as a means of reducing traffic in other increasingly crowded parts of the park. The proposed route schedules to run through 40 miles of wilderness was refused on the grounds that it would have caused considerable ecological damage to a landscape which is still comparatively close to what it was in pre-colonial days.

In Britain both Stoddart (1965) and Simmons (1966) have used the conceptual basis of the ecosystem framework and its trophic dynamic structure to point out its usefulness in modern geography. Stoddart noted that the primary contribution of ecology to geography was in providing a framework for undertaking research into man-environment relationships. In discussing its uses and characteristics he argues the value of the ecosystem concept in geographical investigation is that it brings together environment, man and the plant and animal worlds within a single framework, within which the

interaction between the components can be analysed. Secondly, it directs our attention to structures within the ecosystem and, thirdly it focuses on the functioning of the system.

The ecosystem concept is in origin a biological idea and therefore most of its applications, including those already quoted, have been from the non-human world. Hence investigations into the study of the environment using the ecosystems framework present the investigator with the daunting task of coping with the complexity of the real world and in particular the interaction between man and his biotic environment. The main problem stems from the difficulty analysing change within a system in which man is included. In a natural system this problem need not arise. Ecological succession can be envisaged as being essentially processes of self organisation in which successively more probable states follow less probable ones through the operation of negative feedback processes (Margalef, 1968). Social systems, however, have purpose other than improved self organisation (Bayliss-Smith, 1977). Whereas natural ecosystems are dominated by negative feedback loops, all present day systems involving social man have, in contrast, much stronger inbuilt positive feedbacks (increasing populations and changing technology) which help perpetuate change. In short, the growing complexity and rapidity of change of real world systems makes it very difficult to identify the components and linkages of a system without first making subjective decisions about the critical processes in operation. Where direct measurement and observation are not possible, as for example in an historical context, then the problem of system definition is even greater. Quantification of an incorrectly constructed or partially

defined system merely suggests a spurious precision and a misleading degree of confidence in one's precision.

The real value of the ecosystem approach in geography is conceptual rather than practical. Focussing attention on relationships and responses of components within a system provides an insight as to the likely effects of changes in any one component of a system. Where man is concerned, it enables a study of how some of his actions (both deliberate and unintended) which modify the environment lead to undesirable consequences which may be thought of as negative feedbacks to the ecosystem. These feedbacks can lead to the destruction of one or more biotic species and cause imbalance within the ecosystem.

The application of ecological concepts to the study of man-environment relationships is particularly relevant in coastal areas where undesirable effects of human populations on their environments are becoming increasingly evident. Drawing on concepts used by ecologists, the present research examines a specific human use (recreation) of a particular coastal environment (the Avon-Heathcote Estuary).

2.2 ESTUARINE RESOURCE APPRAISAL

Many of man's settlements in the past have been located on the coast especially near estuaries. Of the world's 32 largest cities 22 border estuaries including the three largest (Tokyo, London and New York). The world's estuaries have thus been subject to extensive modifications by men. The process of alteration that took place in earlier times has increased with time, in relation to increases in population and the demands of man.

Most authors dealing with estuaries have acknowledged

that they are both valuable and vulnerable. It has been suggested that location at the land sea interface is a primary factor contributing to vulnerability of estuaries because in addition to being subjected to the most intensive levels of human use applied to marine areas, they also receive the impact of many activities throughout entire watershed (Knox 1972).

To many in crowded urban areas an estuary conjures up poor visual and olfactory connotations. Obviously for some the mudflat environs with its grey muds and somewhat discoloured waters means that the area is unclean and unsafe for recreation. Consequently they tend to have little objection for the "unused space" to be developed for housing, industrial sites, roads and golf courses. To manufacturers, estuaries often represent a convenient and cheap means of effluent disposal. As a result of these viewpoints our estuaries are rapidly being filled in, polluted and destroyed with little thought given to their other values and the vital role estuaries play in the overall economy of the sea.

Odum (1970) believes that the impact of modern human societies on estuaries has almost always been accompanied by undesirable effects such as despoilation of beauty, destruction of wildlife and severe pollution from industrial waste. It is only recently that we have become more aware of the multi-purpose values of estuarine environments. These include:

a) The biological resources of fishes and shellfish which are of prime economic importance;

b) Their function as a fundamental link in the development of many species of fish and crustaceans (including economically important species such as

flounder, mullets and prawns) and in the migration of many important species such as salmon;

c) Their provision of feeding and breeding sites and stopover points on migration routes for many species of duck, geese, swans and a great variety of wading birds;

d) Their mineral resources of sand and gravel;

e) Their provision of harbours and transport routes for commerce;

f) The recreational opportunities they provide for fishing, boating, swimming and aesthetic enjoyment;

g) The opportunities they provide for scientific investigation;

h) And not the least, a unique ecosystem that gives enjoyment to a wide range of citizens.

2.3 MAN'S INFLUENCE ON THE AVON-HEATHCOTE ESTUARY

The Avon-Heathcote Estuary is a multi-functional resource. An examination of Table 1 shows that recreation is one of several important contemporary uses of the Estuary. Human and natural uses of the Estuary are closely interrelated. Changes resulting from particular use of the estuarine system have repercussions for all other uses. Therefore, a discussion of recreation use of the Estuary needs to consider recreation as one component of an integrated man-environment system which serves many other functions as well.

The complexity and diversity of estuarine systems does not make for an easy understanding of how these natural units function. However the adoption of ecological principles provides a means whereby the intricacies of these systems can be simplified, and, therefore, understood more readily. The

overall condition of Avon-Heathcote estuarine environs in relation to the relevant physical processes is one of potential instability. At present key components of the Estuary environment all interact to maintain some degree of equilibrium. The state is a very delicate one and any artificial inputs from human activities are likely to upset the balance to the detriment of quality of the environment.

An examination of some of the relationships in this habitat and the way in which they interact will serve to show certain human inputs are disrupting natural processes as well as competing with other human activities. For example, until recently effluents from several industries including woolscouring, fellmongering, and a gelatine works were discharged into the lower reaches of the Heathcote River making it aesthetically most unpleasant. Over the last decade the Christchurch Drainage Board has acted to remove industrial wastes effluent from the river and at the present time the only major contributant originates from a commercial coal-gas company (Robb, 1973). Water quality within the Estuary and the river have consequently improved quite considerably over the last 10 years making both areas more suitable for recreation. At the present time plant nutrients enter the Estuary in the form of surface runoff and waste from sewage disposal. As a result nutrient levels within the Estuary have increased, leading to eutrophication (Knox and Kilner, 1973). Consequently the quality of habitat is deteriorating. Unpleasant odours produced by algae decay make the Estuary less attractive as an environment enjoyed by passers by and as a site for recreation activities within and around the Estuary. Also the construction of causways, embankments and infilling have reduced the total area of

TABLE 1

RESOURCE USES AND VALUES IN THE AVON-HEATHCOTE ESTUARY[a]

A) SERVICES

1 Stormwater disposal
2 Sewage disposal
3 Flood control

B) RECREATIONAL AND AESTHETIC

1 Casual swimming
2 Water skiing
3 Casual boating
4 Casual power boating
5 Organised power boating
6 Organised yachting
7 Recreational fishing
8 Aesthetic appreciation

C) WILDLIFE

1 Local birds
2 Migratory birds
3 Non-commercial fishes
4 Invertebrate animals
5 Tidal wetlands
6 Marginal vegetation

D) HARVEST

1 Flounder fishing

E) EDUCATIONAL AND SCIENTIFIC

1 Student instruction
2 Scientific research

a After Knox and Kilner (1973)

wetlands and have affected sediment control of estuarine waters (Knox and Kilner, 1973). In the estuarine system maintenance of sediment profiles is especially important for it is here that recovery of nutrients used in primary production by estuarine flora takes place. This is the basic reason for the high degree of primary production that characterises the mudflat zones of an estuary. High rates of sediment inputs destroy this crucial profile and the recycling actions taking place within it. As a result estuarine biota die and the Estuary becomes unable to support life because the anerobic layer in the profile moves to the surface, displacing the oxidising or living layer. These examples indicate the dynamic and vulnerable relationships involved in the Avon-Heathcote Estuary and illustrate the ease with which man's actions may disrupt existing equilibrium.

Although man's activities in the past have seriously modified the environment of the Avon-Heathcote Estuary the area remains a popular recreation resource for the residents of Christchurch. In recent years the steady improvement in water quality has coincided with growing use of the Estuary for leisure activities. Recent growth in demand for outdoor recreation, combined with the locational advantages with respect to a large urban population suggests that pressure on the estuarine environment from recreationalists will continue to increase. The fragile nature of this environment could mean that recreational pressures will seriously damage the Estuary and its wildlife. It is the author's belief that quality of this estuarine environment could deteriorate markedly unless some attempt is made to restrict use of the Avon-Heathcote Estuary by recreationalists and others.

2.4 IMPACTS OF OUTDOOR RECREATION ON THE ENVIRONMENT

In the last decade an important theme to emerge from research on outdoor recreation is the need to prevent over-use of land and water resources in order to maintain the quality of recreational experience and ensure the environment is not seriously degraded. Increasing numbers of participants in outdoor recreation are bringing about changes in the environments to which they resort. Increased mechanisation of recreation, including the growth of such activities as snowmobiling, skiing, power boating and driving dune buggies, have magnified the potential for environmental impact (Wall, 1977). Participants in informal activities such as walking, swimming and picnicking also have an impact. Even those who claim to be sensitive to the environment have the power to damage areas to which they are attracted, particularly when grouped together in large numbers or over long time periods.

From the resource manager's point of view the number of participants in an activity or the volume of visitors at a site are of less interest than the scale of environmental degradation caused by recreation and level of satisfaction derived by the visitor. Depending on the activity and site in question there is not necessarily a correlation between the two. High visitation rates and crowding levels are quite often associated with ecologically degraded environs in National Parks, on the coast and in camp-grounds in areas of high recreation pressure (Mercer 1977). In some areas a small number of recreationalists can create a great deal of ecological damage (dune buggies and trail bikes for example) whereas in other areas large numbers of people can be tolerated for years. This underlines the necessity of collecting

quite localised data relating to recreation participation rather than concentrating the effort or large scale generalised surveys at national or regional levels.

With a trend toward large amounts of leisure time, the frequency with which outdoor recreation areas are used is increasing. Consequently those responsible for planning and management of recreation are increasingly concerned at the rapidity with which recreational environments deteriorate under pressure. A combination of factors, such as those mentioned above, have generated a fresh approach to recreation research evidenced by the growing literature related to carrying capacities of recreational environments. Wagar (1964), Tivy (1972) and Leopold (1974) for instance have been directly concerned with establishing basic criteria for determining the potential of sites to absorb recreational activity. Ussher et al (1974), Kirkby (1971), Pears (1966) and Bird (1971) have focused their attention on mass recreation impact. Invariably these have been delicate environments where man has shown himself to be capable of upsetting a fine state of ecological balance. The Cairngorns, the Norfolk Broads, and some of the coastal lagoons in Southern Australia are examples of areas where the recreational pressures are markedly seasonal in incidence and have shown themselves to be devastating in their local impact. Batten's (1977) investigation provides an interesting discussion on the effects of sailing on water birds. Within New Zealand relevant research can be found in Henderson and Stagpole (1974) while Young's (1977) survey of the New River Estuary gives a meaningful account of the potential of an area to withstand growing pressure from recreation.

As the leisure demands of the Christchurch population

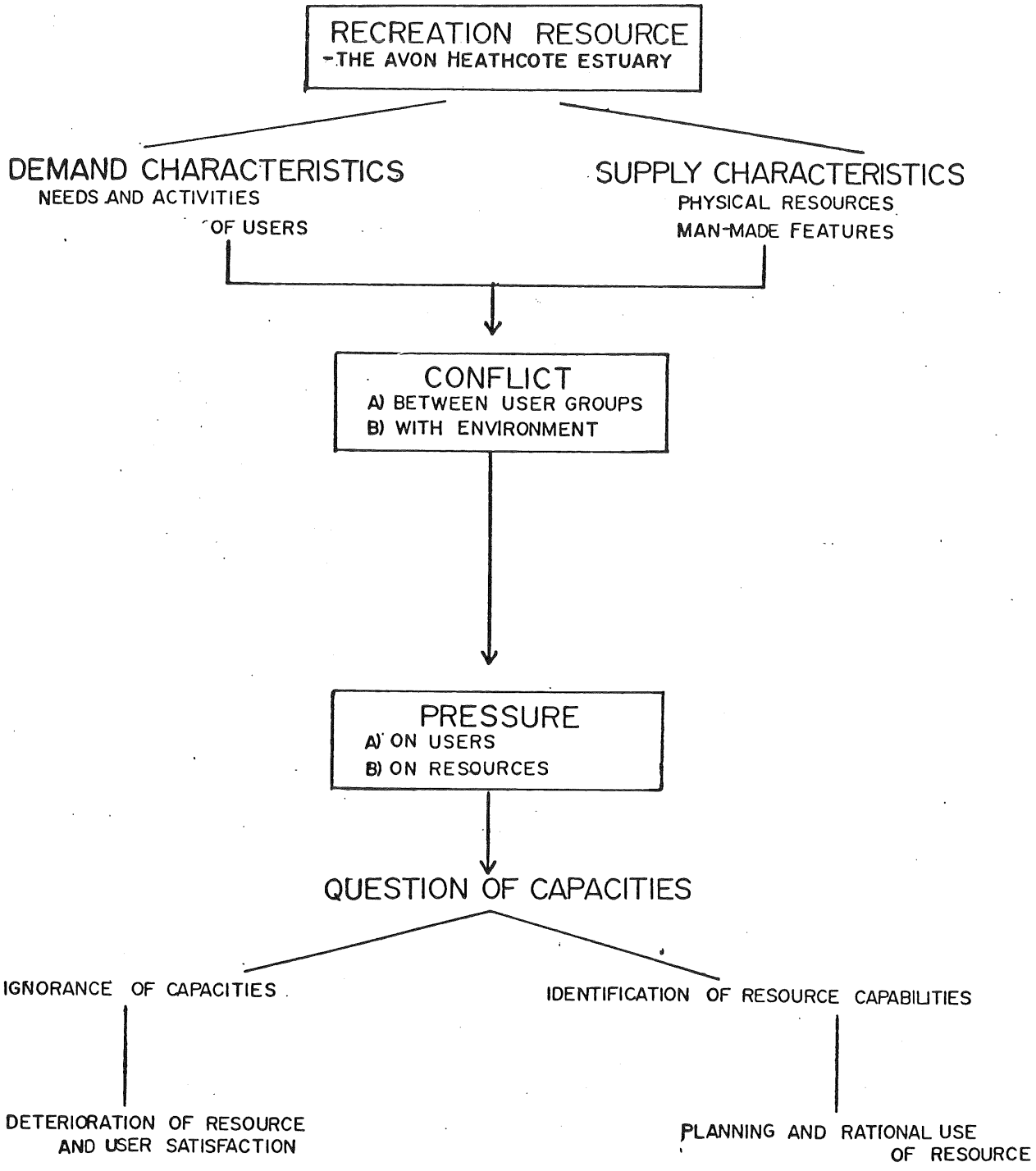
grow the Avon-Heathcote Estuary will come under increasing and conflicting recreation pressures. Sensitivity of this environment and the advantages it offers for recreation make the Estuary particularly susceptible to damage when exposed to inappropriate or excessive use. Faced with this situation research on the recreational use of the Avon-Heathcote Estuary needs to consider both the supply and demand elements of the recreation equation.

2.5 RECREATIONAL FRAMEWORK

The most important considerations for the recreational planner are the impact, overtime and space of the supply and demand for recreation. For the present study the extent of recreational resources and the demand made upon them are estimated by means of demand-supply methodology. Numerous recreation researchers have been concerned with demand-supply as the basis for impact assessment as well as the design of management policies (Burton, 1971). Clawson (1963) when discussing recreational planning and design, notes that research to be wholly meaningful or accurate must consider both resources and users. In a setting, such as the Estuary, where three elements, human users, human activities and the physical environment exist and interact analysis of both resource and users is essential in considering man's relationship with the environment. Understanding these relationships allows for an appropriate balance to be struck between conservation of scarce resources (land and amenity) and the provision of facilities to provide for further use and enjoyment of the environment.

The framework for the thesis is summarised in Figure 2. In the chapter which follows, the application demand and

Figure 2: Thesis framework



supply within a working framework form part of a discussion of methods of data collection. Chapter Four examines the recreational resources of the Avon-Heathcote Estuary in the context of physical characteristics of the environment, assessment of recreation resources and their spatial distribution within the Estuary. In Chapter Five, recreational demand is analysed in terms of measures of recreationalists' attitudes, preferences and activities. The last chapter introduces the concept of carrying capacity in an attempt to reconcile recreation with conservation of the estuarine environment.

CHAPTER 3: RESEARCH METHOD

Adoption of a demand supply approach for the analysis of recreational use of the Estuary necessitated two major areas of data collection. One involved collection of information on the quantity, quality and distribution of recreational resources. The other relates to assessing demand for these resources. Methods adopted to satisfy these data requirements are examined in this chapter.

In the study of recreational demand and supply, a notable characteristic has been the tendency for investigations to assume they must carry out their research by means of interview surveys of one kind or another. Little attention has been paid to alternative approaches. Moreover, even in cases where an interview survey can be shown to have been necessary, little thought is given to the question of complimentarity of survey data with that generated using other techniques. In this study an attempt was made to incorporate a range of data collecting techniques into the research design.

3.1 METHODS OF DATA COLLECTION

The methodology adopted involved a combination of approaches: a survey questionnaire of users, observation of recreational pursuits in the field, field study of physical characteristics of the Estuary, and informal interviews with officials, representatives of local authorities and individuals with considerable local knowledge of the area. Major sources of published information on the Estuary are Knox and Kilner (1973) and Hutchinson (1973). Background information on ecology and physical development of the area was gained from Brown (1976), Blake (1964), Linsey (1944), Knox and Kilner (1973) and De Thier (1971).

3.2 RECREATIONAL RESOURCE SURVEY

The survey of recreational resources was in two parts. One was concerned with identifying resources through an on-site activity survey and the other involved survey and mapping of the identified resources. Both were carried out concurrently.

The procedure adopted for the survey was twofold. First, recreational use of the Estuary was observed and a record kept of activities. The precise area where each activity occurred was noted, with a description of the physical characteristics of the site. These data were supplemented by information obtained in interviews with people using the Estuary (a copy of the relevant questionnaire can be found in Appendix 2).

Similar information on the suitability of the Estuary for particular activities was obtained through personal open ended interviews with experienced representatives of each activity. These respondents were selected on the basis of their involvement in organisations or committees responsible for promoting particular uses of the Estuary. Such an approach is especially relevant to activities organised through clubs or associations, although it is less relevant in the case of informal activities such as bathing or picnicking.

3.3 DEMAND SURVEY

The aim of the demand survey was to examine the present patterns of use of recreational resources at the Estuary. The major source of information in the 'existing uses' section of the study was procured from onsite interviews (see Appendix 2).

The questionnaire

The questionnaire was designed to collect three types of data:

1) information on personal attributes of the respondent
2) details of his spatial behaviour in the recreation system
3) a range of information on attitudes and preferences

Profile data collected included age, sex and stage in life cycle of each respondent. Questions on socio-economic variables such as income and occupation were omitted because this information was not considered to be directly relevant to the enquiry. The individual's spatial relationship to the recreation system was assessed in terms of distance travelled from home to the Estuary, sector of the city in which home was located, number of activities pursued and the frequency of visits to the area. In addition, information on attitudes towards the environment, including user's satisfaction with the recreation experience, preferences for improvements and reasons for choosing the Estuary as a venue for recreation was collected from the interview survey.

In obtaining opinions and attitudes, open-ended questions were used because they allow for flexibility in response and they avoid forcing a respondent into an answer which does not reflect his views. In addition respondents are given the opportunity during the interview to elaborate on reasons for holding specific views or opinions. The main disadvantage with open-ended questions is in the problem of comparability of answers. The wide range of responses makes it necessary for the investigator to summarise and categorize replies and this frequently means that detail is lost as generalisation proceeds. Errors are also introduced when an

interviewer records a long and rambling answer in verbatim, or as is often the case, in attempting to summarise the reply, he selects only a part.

The questionnaires were administered verbally by the author and this ensured some control over consistency in response and sampling procedure. The presence of an interviewer also permitted the explanation of questions not understood and a more detailed and elaborate answer (Oppenheim, 1966).

3.4 OBSERVATION

Observation as used in this study differs from everyday observation in that it is a systematically organised procedure. The term, as used below, refers to an act of recognising and noting some fact or occurrence relating to recreational behaviour.

In the demand analysis observation is used as a complementary technique to interview surveys. This method is seen to be particularly relevant in the study of activity patterns of recreationalists since it provides information on the spatial distribution of users and activities.

Subjectivity represents a problem when observation techniques are employed (Burton and Noad, 1968). Observation is necessarily partial and selective. Even though trained and experienced users of the technique may attempt to separate observation from interpretation it is likely that their own particular biases and feelings may cause them to observe selectively. In attempting to reduce the subjectivity inherent in this method an attempt was made to systematise observation by employing photographic evidence of recreational activity. The limitations of resources available for the study did not permit the use of aerial counts or photography as used by

James et al (1971). Instead photographic observation was conducted from four vantage points located in the hill suburbs bordering the southern shores of the Estuary. The vantage points were transversed at hourly intervals. At each location photographs of recreational behaviour were taken. Inspection of plates in Appendix 3 indicates that the photographic technique was not entirely satisfactory for the present study. The unsuitability of the method stems from the fact that:

A) many of the areas used by recreationalists were not visible due to obstruction from buildings and trees.

B) the number of recreationalists involved and the types of activity were not easily distinguished from the vantage points selected from photographing the Estuary

3.5 SAMPLING PROCEDURES

Random sampling involves two levels of selection:

1) selection of the population to be sampled (the sampling frame).

2) selection of the individual or group for interview (the sampling unit).

For on-site surveys, such as the Estuary recreation study, there are no lists of names and addresses representing the total survey population from which a sampling frame can be drawn. Another problem arises in this regard because characteristics of recreational activity may differ over time. Surveys of seasonal activity pose particular problems such as definition of seasonal boundaries and the influence of seasonal weather variations on the type and frequency of activity.

Because of time limitations the summer season of 1979 was selected as the survey period. It is during this period that most of water based recreational activity can be expected

to occur. Pilot surveys were undertaken over the last two weekends of December 1978 during which time an opportunity was taken to test the questionnaire. The bulk of the interviewing was carried out between January and mid-April 1979.

Areas of survey

In choosing sites for sampling users, the Avon-Heathcote Estuary has a disadvantage for the researcher in that access is almost unlimited around its entire perimeter. The absence of a few well defined access points made it necessary to select sampling locations over a wide area in order that the sample be considered representative of the total population of summer visitors to the Estuary. Initially, pilot surveys were carried out at locations where the author observed concentrations of recreational activity. It became evident, however, that in order to secure adequate coverage of minority activities the main body of the survey would need to cover the entire Estuary.

Sampling unit

There are two possible sampling units for use in site surveys:

1) the individual
2) the group

For the purpose of this study it was decided that recreation groups are unsatisfactory units for survey because as Davidson (1970) notes, they embrace a number of different social and economic units (for example household, wider family group) and do not permit the normal cross tabulation of profile characteristics such as age or sex, with recreation activity or attitudes. The individual, therefore, was selected as the sampling unit, even though in practice answers by more than one member of the group were given to some questions. The sample size is the total number of individuals surveyed not

this number multiplied by the average number of people in the groups from which individuals were drawn.

Sample selection

For site surveys of recreation, truly random sampling is not possible for practical reasons. This is due to the lack of sampling frame for site visitors. In this study a form of quasi-random or regular sampling has been used.

Few recreation areas have the advantage for the researcher of a single entry and exit point, but where this situation exists it is a relatively simple matter to interview, for example, every 'nth' person on leaving, with the interval related to the required size of the sample, the speed of interviewing and frequency of departure.

Sampling of visitors at the Estuary proved difficult as the area contains several access points and recreational activity is dispersed. Therefore the sampling procedure adopted involved systematic traverses of sample locations with individuals being interviewed at a constant rate. After an interview was completed the next person on the site was selected. An attempt was made to cover all locations in a given day but where this was not possible those areas which were not covered were given priority on the next interview occasion.

3.6 INFORMAL INTERVIEWS

Interviews with those involved in recreation and estuarine management were designed to gauge institutional responses to patterns and problems of estuarine recreation. Similarly individuals or groups who had an interest in the Estuary were contacted. Twenty-two individuals representing a wide range of interests were interviewed in this part of the field work.

Interviews with the personnel concerned were carried out on a semi-structured basis (Burton, 1971). To ensure that all interviews generated some common data a set of questions were designed to form a broad outline of each interview. The questions were:

1) What do you think are the main attractions of the Estuary as a recreation resource?
2) Characteristics of activity patterns including where and when the activity occurs and the numbers involved.
3) What are the main problems facing recreational use of the Estuary?
4) Do you think there is any conflict or likely conflict of use of the Estuary among recreationalists?
5) Do we need management policies or planning for current/future use of the Estuary for recreation? If so, what directions do you think this should take?

The use of this broad outline did not prevent discussion focusing on areas where individual respondents had particular interest, expertise or responsibility.

Conclusion

The methods used in the survey had the desired effect in collecting information on recreation users and resources of the Avon-Heathcote Estuary. Combining a range of data collection techniques generates a greater depth of information on the supply and demand of recreation of the Estuary. The major weakness of the research method stems from the subjectivity which is evident in both demand analysis and resource evaluation.

CHAPTER 4: RESOURCE SURVEY

This chapter is concerned with an assessment of the recreational resources of the Avon-Heathcote Estuary. The first part deals with the resource concept and its application to recreational research. In the second part recreation resources are identified by highlighting the physical and biological characteristics of the Estuary, and considering what resources are required by recreationalists when using the area.

4.1 INTRODUCTION

Outdoor recreation does not take place in a vacuum; the various activities depend for their continuance on the availability of physical resources able to support and sustain certain demands. An objective evaluation of the supply of recreation resources available at the Estuary is important if the present relationship between demand and supply is to be assessed. The aim of this part of the study, therefore, is to locate and identify those resources which, because of their physical characteristics, are suitable for outdoor recreation activities. It is hoped that the end result will not only provide an evaluation of resources, in terms of their quantity and quality, but will also highlight the constraints on the use of the Estuary for recreation.

Most assessments (Linton, 1968, Coppock 1970, Canada Land Inventory 1969, and Yong 1974) of the suitability of natural resources for outdoor recreation have been carried out on a regional basis. The criteria that would be relevant for a broad regional assessment are not entirely appropriate to the selection and planning of a specific site. The problem of scale means that some modification of procedures

used in regional assessment will be necessary in order to apply these to a specific resource. The four major elements which Coppock (1970) used for evaluating the Lanarkshire landscape are adapted to form the basis of a resource appraisal in this study. The elements relate to the landscape's ability to support water-based recreation, ability to support land-based recreation, scenic quality and the ecological quality of the environment. Unlike the Lanarkshire survey, this investigation does not attempt to grade environments in terms of their recreational quality. Rather, the aim of this part of the survey is to identify the resources which make the Estuary capable of supporting recreation activities. Although value judgements are inherent in some assessments, others are based on more objective information. No attempt has been made to estimate the 'worth' of the identified resources as this will differ among individuals.

4.2 RESOURCE CONCEPT

The functional approach to resource phenomena holds that resources are cultural constructs emerging from the interaction of human wants and capabilities (Hunker, 1964). Thus, resources cannot be conceived as tangible objects, so much as the means of attaining certain socially valued goals by way of manipulation of selected elements of the environment (Oriordan, 1971).

The resource base is not constant in itself either, but must be viewed and evaluated in dynamic terms. Presently valued resources can become redundant and changing economic, social and technological circumstances can reveal new recreation potential in previously neglected areas. Thus, the identification of elements of the environment as recreation

resources will depend on a number of factors - technological, economic and perceptual. Physical characteristics are a fundamental aspect of the recreation resource base, but such variables as location, accessibility, management, and the socio-cultural framework have a direct bearing on resource functions and on the recreationalist's decision to choose a particular resource for his use.

4.3 IDENTIFYING RECREATION RESOURCES

In principle establishing what resources are actually used for outdoor recreation should be a simple matter of survey but in practice this is not the case. The principal difficulties are the very wide range of activities in time and space, difficulties which are aggravated by the fact that the most common form of outdoor recreation, informal passive recreation, shows these to a marked degree, for by its very nature it is both unorganised and widespread (Patmore, 1972). Investigators have usually focussed their attention at sites which attract large numbers of visitors and contain easily identifiable resources. Equally important is the need to identify those resources which attract activities which are numerically less important.

Recreational resources are not seen simply as an inventory of identifiable physical elements but rather as dynamic elements which are defined culturally by the nature of activities. While the physical environment will necessarily dictate the absolute level of supply, resources should be seen within this total constraint as expanding and contracting in response to human effort and behaviour (Zimmerman, 1951). Lavery (1971) maintains that planning for outdoor recreation requires information both on those resources which are

currently used and on those which on account of their inherent characteristics, would be suitable for recreation use at some future date. Within the study area attempts to identify recreational resources are based on what is used by the visitor. Thus, the survey of recreational resources was focussed on identifying the type of activity and the factors in the natural environment that promoted these activities.

The individual's view of what constitutes a resource is influenced by his perception of the components of the bio-physical environment. Similarly, the identification of recreational resources is a very personal matter and hence, a component of the environment which is thought to be of value to one individual may be seen as worthless by another. The Avon-Heathcote Estuary, for example, has different meanings for different people. At one end of the spectrum the Estuary is seen as a valuable community asset serving a wide variety of functions to the people of Christchurch. Yet on the other hand the Estuary and its environs are perceived as an unsightly and detracting aspect of Christchurch and one that should be "cleaned up and used profitably". It is obvious that the Avon-Heathcote Estuary does not represent the ideal recreation environment. The location of the Estuary alongside the Christchurch Drainage Board oxidation ponds and the appearance of the Estuary at low tide make the area unattractive to a sizeable portion of the urban population.

4.4 THE RESOURCE BASE

Although there are both natural and man-made constraints upon its recreational use, the Avon-Heathcote Estuary can be regarded as an important venue for coastal recreation in the Christchurch region. Its attractiveness and popularity as

centre for both land and water based recreation may be attributed to several factors, all of which combine to make the Estuary a valuable recreation resource.

Location

A key consideration in the assessment of opportunities for outdoor recreation is the relative accessibility of resources to recreationalists (Coppock and Duffield 1975). This accessibility comprises both time and costs of journey, and physical or legal right of access.

Patmore (1972) and Mercer (1971) argue that the greatest demand for recreation occurs for those activities that can be pursued near home. Thus a major factor contributing to the Estuary's popularity is its proximity to a large urban population. Despite the greatly increased mobility of today's society, there is a significant section of the Christchurch population which for a variety of reasons take their pleasure close to home. In addition to use of access by private car the Estuary can also be reached by public transport and children on their bicycles.

Public Access

The desire or need for public access to the foreshore has changed over the years. With the recent rapid increase in the popularity of water-based recreational activities there is a greater need for providing public access to land adjacent to waterways. McHarg (1969) argues that waterways and the land adjacent to them constitute a principal recreational resource available to any urban area, therefore it follows that recreational use should have prior claim to land adjacent to waterways.

Most of the foreshore surrounding the Estuary remains accessible to the public. However through the years there

has been a considerable loss of the right of public access to river banks and foreshores. The record sheets of the Lands and Survey Department, Christchurch, show that a one chain road reserve was laid out around the whole of the shoreline at the Estuary and along the banks of the lower reaches of both the Avon and Heathcote Rivers. Once shipping left the rivers, however, these road reserves and towpaths in the lower reaches of the rivers were seldom used by the public. The pollution of the lower reaches of the Heathcote River by industrial wastes did not make it attractive to the public (Knox and Kilner, 1973). Furthermore there is no longer the right of public access to the section of the west shore of the Estuary north of Linwood Avenue although a one chain 'paper' road still exists.

From the survey results presented in chapter five it is evident the present demand for improved access is limited. Only 4 per cent of those contacted desired greater access to the foreshore of the Estuary and the two rivers. Admittedly the foreshore adjacent to the Drainage Board's oxidation ponds and the lower reaches of the Heathcote River are at present the least attractive areas of the Estuary from a recreational viewpoint. However, if the Estuary were to recover to its former state then the recreational potential of the foreshore adjacent to the Estuary and the lower Heathcote River would be considerable.

4.4.1 Water based recreation resources

From the recreational viewpoint the most singular characteristic of the coastal environment is the very wide range of both active and passive pursuits that are possible (Mercer, 1972). The report on Shoreline Recreation Resources of the United States (1962) listed the following activities as

being important to the coastal planner:

Activities exclusively 'coastal':-	Surf riding, Coastal hunting and fishing, Skindiving, (spear fishing, underwater exploration), Beachcombing.
Activities associated with water bodies:-	Swimming, Boating (motor-boating, sailing and canoeing) Water skiing, Fishing.
Activities not limited to coasts or inland water bodies:-	Hiking and Walking, Swimming, Birdwatching, Horse riding, Picnicking, Camping, Photography, Sketching, Painting, Sightseeing (scenic, scientific, historical), Nature study (biological, geological, botanical)

Of those activities listed above, only surfing and skindiving are not practised within the study area. The variety of opportunities available to visitors is important in influencing selection of the Estuary as a site for recreation. The effect of this diversity is to provide opportunities for a wide variety of recreation ranging from those activities such as yachting and water skiing, which have specific water space requirements, to those activities such as viewing and driving for pleasure which depend more upon the overall character of the Estuary.

Water resources have long been a major element in the enjoyment of many forms of outdoor recreation, especially in maritime countries where a majority of holidays have traditionally been taken at the coast. More recently, waterside areas,

both coastal and inland, have become increasingly popular locations for second homes as well as the natural focus for recreation trips. Tanner (1971), for instance, notes that during the last 20 years water sports have achieved a striking growth even within the context of the general and rapid expansion in outdoor recreation.

The focii of recreational use of the Avon-Heathcote Estuary revolves around the water resource. From a recreational viewpoint the value of water is two fold. Firstly, water is used as a medium on or in which recreational activities take place. The second general type of use is that in which water provides principally the background or setting (which is considered later) enhancing the intrinsic satisfaction to be derived from recreational pursuits.

The advantages of the Estuary as a venue for water-based recreation is indicated by the diversity of opportunities available. Among the wide range of activities the popular ones are:

1) Sailing and boating,
2) Fishing,
3) Picnicking and sunbathing adjacent to water,
4) Swimming and bathing,
5) Power boating and water skiing,
6) Canoeing and rowing.

According to a large number of water-based recreationalists using the Estuary, the most important attributes are the shelter from the prevailing winds and the high level of safety it affords. The calm waters associated with the area adjacent to the Pleasant Point domain are ideal for water skiing and power boating. The consistency of wind speed and direction and the shallowness of the Estuary make the area particularly

suitable for pleasure boating and a valuable training ground for young and inexperienced sailors.

The significance attributed to recreational resources is largely determined by the availability of supply. Recreation areas and landscapes which are unique either because they are few in number or can accommodate activities that cannot be provided elsewhere are of greater recreational value than those areas or facilities which may be readily replaced, such as playing fields. The Avon-Heathcote Estuary represents the only water body in the Canterbury area which is suitable for competitive power boating. The Estuary, therefore, has significance at both the regional and national level in terms of its appeal and suitability for power boating.

According to Coppock (1970), the size and water quality of resources influence their capability of, and suitability for, supporting recreation. The Avon-Heathcote Estuary which encompasses 716 ha (1770 acres) of water is sufficient to allow most forms of water-based recreation to take place simultaneously. Activities such as power boating and water skiing, which require water environments of bigger dimensions, are able to be carried out on the Estuary.

The other parameter which affects recreation is quality of water resource. Criteria for water quality vary markedly according to the use made of the water. Some users (e.g. scenic viewers) may base their evaluation on water clarity and visual impact while other users, such as Acclimatisation Societies, consider pollution in terms of chemical and organic qualities affecting fish and under-water habitats. The most recent surveys of water quality within the Estuary were undertaken by the Water Resource Council in 1974 and 1975. The results of the Council's surveys showed that although water quality

varied according to location, the majority of sample locations conformed to standards for S.B. class water, which is deemed suitable for body immersed activities.[1]

Water quality is the factor which most seriously affects the aesthetic, recreation, economic and habitat values of the Estuary. Some of the recreation uses in the areas, such as swimming, are restricted by quality of water. It is likely that as the water quality is upgraded, this use would increase substantially. The full potential of the Pleasant Point-Jellicoe Park area could then be recognised. This area, because of its shelter from the prevailing onshore wind, is uniquely suited for water-based family recreation activities which are restricted at present by the water quality conditions.

4.4.2 Land based recreation resources

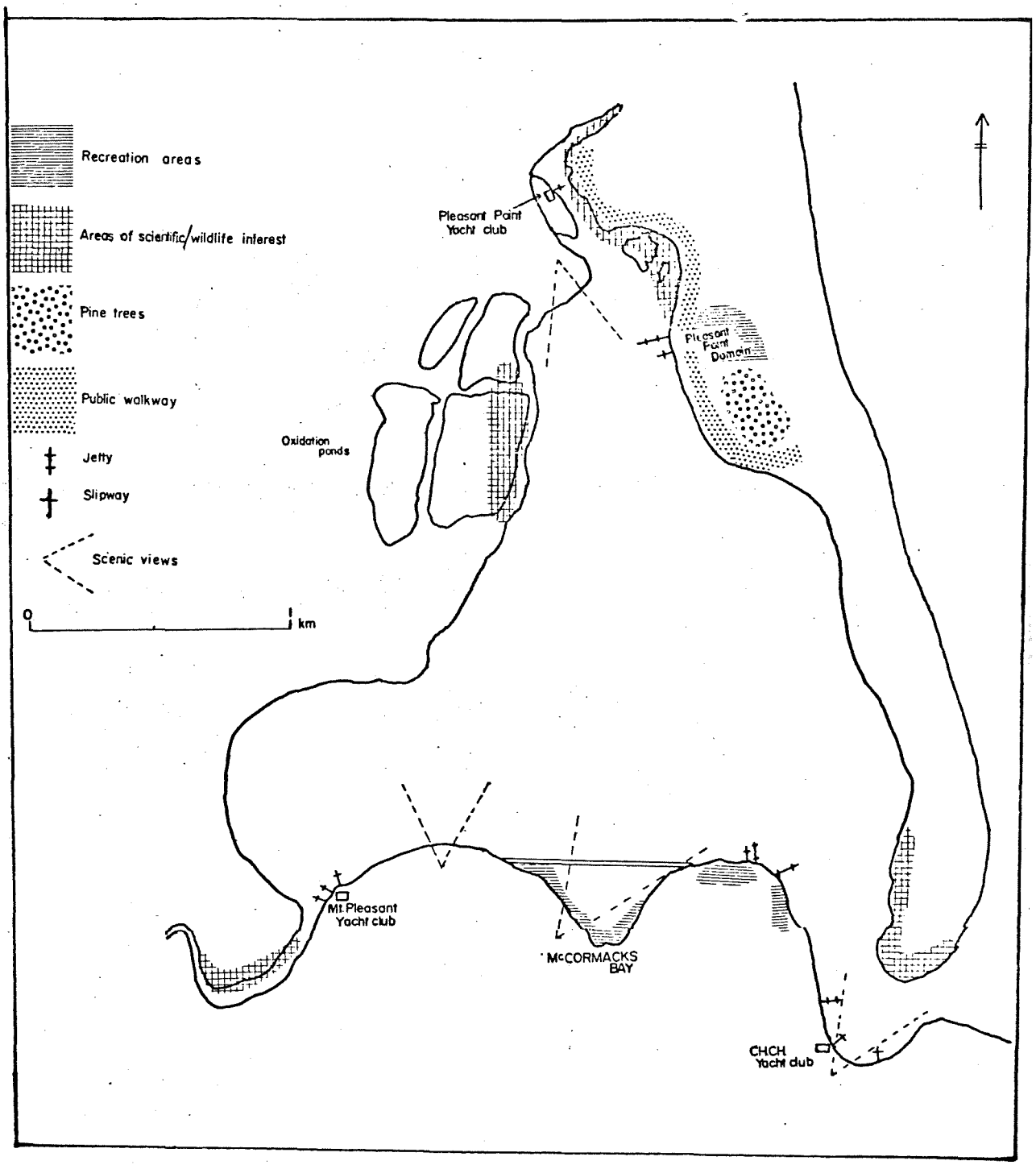
The major attraction of the Estuary for recreation is the expanse of calm water which supports many forms of land resources available for recreation. Land resources available for recreation consist of the land adjacent to the Estuary. Although limited in size, these areas cater for a variety of outdoor pursuits. The following activities have been identified as using the land resources within the study area:

- Sunbathing (picnicking)
- Painting, sketching
- Viewing recreation
- Birdwatching
- Informal family recreation
- Horse riding
- Strolling along shoreline/on tidal mudflats
- Collecting shells/seaworms
- Trail bike riding
- Scenic walking

1 Water classes as set down by WATER AND SOIL CONSERVATION ACT 1967

A map showing the location of these activities is given in Figure 7. Information obtained from questionnaire surveys and personal observation suggests that land-based recreation in the area is largely informal, relies on the natural setting, and makes few demands in terms of facilities required. The areas most heavily used include the Pleasant Point-Jellicoe Park region and the area in the vicinity of the public slipway at Celia Street (see Plates 1V & V).The latter location is an attractive site for family recreation as it provides a popular swimming spot and contains a large grassed area suitable for informal ball games such as cricket and soccer. The Pleasant Point domain and the public walkway adjacent to South Brighton Park (see Fig. 3) provide valuable recreational amenities for those using the Estuary, and for the citizens of Christchurch. The walkway, having access from both ends, is a planned half hour walk of scenic and natural history interest. During high tide, this walk offers one of the most scenic sweeping views of the Port Hills - through mature pine trees and across a large stretch of calm water. Presently there are tentative proposals to have the present public walkway formalised as a scenic walkway under the 1979 Walkways Act. Only then will the potential of this area for passive forms of recreation be realised. The designation of the walkway as a 'scenic walkway' could mean that the area develops into an important wildlife refuge. With careful management, such as the education of the public through lectures, brochures, pamphlets and the design of board walks to observe the bird and plant life inhabiting the shores of the Estuary, the area could become a valuable resource for the study of natural history.

Figure 3: Recreation Resources within the study area



4.4.3 Ecological-Wildlife resources

According to Helliwell (1960), the value of wildlife in recreation can be subdivided into the following categories:

i) education - to broaden one's mind

ii) natural history studies, photography etc.

iii) contribution to the landscape or character of the locality.

The recreational value of wildlife is seen to be wide ranging, although it is frequently only a minor part of the recreation experience. Mutch (1968) found, for example, that, of visitors to four Forestry Commission forests, only 8%, 6%, 6% and 1% respectively gave "nature studies" as the prime reason for visiting the forest. On two areas of land managed as nature reserves in Yorkshire, Usher et al (1970) found that 15% of visitors come primarily for reasons of natural history. The presence of wild plants and animals will, however, contribute something to the recreational experience of most of the visitors to such areas.

The increasing numbers of visitors who participate in outdoor recreation and the growing popularity of activities in the broad field of natural history confirm the appeal of ecological resources (Coppock 1970). Indeed, the very need to formulate policies to conserve these resources is a recognition of the power that they have to attract recreationalists; for features of importance for conservation may themselves be focii for outdoor recreation, while variety of habitat generally contributes to both ecological richness and amenity. More recently, in New Zealand, the trend towards educational tours, both by public and students, of these resources have imposed an ever increasing use-pressure on them. These irreparable and irreplaceable resources must be protected

against detrimental effects from users, thus the need for an assessment of relative ecological quality of landscape to bring out areas of greater importance for conservation purposes.

Increasing urbanisation has lead to a growing appreciation of wilderness which in Lucas's (1977) opinion is a combination of natural area and state of mind. An area of wilderness is hard to find close to an urban centre and perhaps it is the estuarine environment that can come closest to providing a wilderness outlet close to home. There is very little wild habitat remaining in the immediate vicinity of Christchurch, therefore attempts should be made to protect those few remaining natural environments. The ecological complexity and diversity of the Avon-Heathcote Estuary and its environs represent a valuable resource for the people of Christchurch. It is of great importance from at least three points of view that some of the relatively unmodified areas of the Estuary which remain should be preserved and protected from disturbing influences. From the recreational point of view it is desirable to retain a little of the wild environment for its aesthetic value, for some forms of recreation (such as bird watching and painting) and to remind us what the land was like before settlement. Secondly, there are scientific reasons for wishing to retain some undisturbed natural areas. There is a genuine need to have access to such areas for scientific study. Natural environments provide a yardstick against which changes may be measured (Burrows and Knox, 1973). Thirdly, natural habitats provide a wild life resource. This is mainly in the form of nesting, feeding and resting areas for game birds and other wild animals. The Canterbury Branch of the Royal Forest and Bird Protection Society sent a request for the protection of wetland areas in the environ of the Avon-Heathcote Estuary to

the Mayor and Councillors of the Christchurch City Council. The Society felt that various important areas in the environs of the Estuary were in urgent need of protection. The location of these proposed reserves and a brief description of each area is provided in Appendix 5.

Fish

The ecology and distribution of fish in the Avon-Heathcote Estuary have been studied by Mundy (1968) and Kilner (1973). Twenty eight species of fish have been recorded for the Estuary (see Appendix 4). Five distinct groups can be recognised:

1) Seasonal species that move into the Estuary predominantly to breed, e.g. redfinned bully.
2) Permanent species that breed along the rocky shoreline, e.g. common bully, twister, rockfish.
3) Species that migrate freely between the Estuary and the sea while spending their juvenile life in the Estuary, e.g. sand flounder and yellow-eyed mullet.
4) Transitory species that enter the Estuary at irregular intervals to feed. They include kahawi, red cod, barracuta, red gurnard and most of the seasonal species.
5) Finally there are those species that use the Estuary principally as a migration route to other areas for the purpose of breeding, e.g. short finned eel, whitebait and brown trout.

Eight of the main species which occur in the Estuary are permanent residents, sand flounder, yellow bellied flounder, common sole, yellow-eyed mullet, kahawai, spotty cockabully and common bully; puffer fish are seasonally present.

Sand flounder is the most abundant species (Kilner, 1973). The resident population consists of mainly young flounders.

There is an annual migration in excess of 20,000 fish from the Estuary to offshore spawning grounds, either to the flounder patch of the Waimakariri River or the winter ground south of Timaru.

Birds

Knox (1973) has identified some 26 species of primarily acquatic birds which are frequently seen on the Estuary. Many are permanent residents, others frequent the Estuary as a feeding area during the non-breeding season. They include:

Most Commonly Seen Birds	Black billed Gull, Pied Stilt, Eastern Bartailed Godwit, South Island Oyster catcher
Frequently Seen Birds	Black backed Gull, Black Swan, Grey Duck, Mallard Duck, Pukeko, Red Billed Gull, White fronted Tern
Rarely Seen Birds	Bonded Dotterel, Black fronted Tern, Black Oyster catcher, Black Shag, Canada Goose, Caspian Tern, King Fisher, Little Black Shag, Little Shag, Red Heron, White Heron, Spotted Shag, White faced Heron, White Flippered Penguin,

The bird watcher occasionally sees many other species including Black Teal, Crested Grell Knot, Paradise Duck, Sandpiper, Tattler, Ibis Gannets and Petrels in the Estuary and a host of land birds in nearby areas. An increasingly important species feeding on the margins in the water is the starling; flocks of over a hundred are common on the Estuary.

There are several reasons why the Estuary is a particularly suitable site for ornithological pursuits: 1) Besides being in close proximity to the urban centre, the birdlife at the Estuary has not only national and local value as a recreational, educational and aesthetic resource, but also international significance as New Zealand is host country to the Bartailed Godwit (B. Calder pers.comms). The Godwit

nests in the Arctic tundralands of Asia and Alaska, migrating south to spend the northern winter in the southern hemisphere. 2) The adjacent lands surrounding the Estuary provide a diversity of species. For instance, numerous swans, ducks, geese and pukekoes provide an interesting overflow of birdlife from oxidation ponds to the Estuary. 3) Finally the chances of something rare appearing offer an additional attraction for those interested in bird watching.

4.4.4 Scenic Assessment

Of the criteria used to identify the recreation resources of the Avon-Heathcote Estuary, scenery is the most contentious because of the difficulty involved in generating an objective appraisal of scenic resources. In discussing scenery as a natural resource Linton (1968) argues that scenery which charms, thrills or inspires is a potential asset to the land in which it is found. But like other resources it is a potential asset that becomes actual only when valued and exploited by society. This comment is equally applicable at the individual level where the perceptions and awareness of the individual determine whether the potential resource becomes available supply.

Informal recreation, particularly the drive to the countryside or to the coast, is overwhelmingly the most important form of outdoor recreation, at least judged by the number of participants and frequency with which they participate (Patmore, 1972, Neighbour, 1973). All active forms of recreation are undertaken by small minorities, and although these proportions are likely to change with rising levels of mobility and affluence, the dominance of passive recreation, confirmed by all surveys undertaken in Great Britain, will persist in the foreseeable future.[1]

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1 For more on this theme see British Tourist Authority/ University of Keele, Pilot National Recreation Survey, No.1 (1967)

There is therefore a strong case for giving particular weight to informal passive recreation in any assessment of suitability.

Some consideration has already been given to aspects of informal use of the Estuary by inclusion of picnic sites and accessible regions of the shoreline in assessments of land and water based recreation. The prominence given to scenery accords with the Countryside Commission's (1972 c) decisions on its priorities; for it, too, has decided that its primary standpoint with respect to recreational use of the Scottish countryside is that of scenery and landscape. Simmons (1975) in discussing the recreational use of water claims that it is in its role as a background and scenic asset that water is used by the majority of people in urbanised centres for whom river banks, coasts, lake shores are attractive locations for both passive and informal recreation. In recognising the importance of landscape features, this final section on resource appraisal concludes with a brief discussion of the scenic and landscape characteristics of the Avon-Heathcote Estuary.

Assessment of the quality of outdoor recreation resources depends partly on landscape quality and amenity factors and partly on the suitability of the resource for specific recreational activity. The principal amenity factor to be considered is the contrast between rural open space and the built up urban environment. Except for the Port Hills and the Estuary Christchurch would be geographically a most uninteresting city. Each of these provide visual variety and relief not available elsewhere in Christchurch. The contrasts generated by these landscapes can be expressed in numerous ways, through views outward from the urban area, views of the urban area from outside vantage points, 'escape' from the urban area by visits to places where contact with urban influences is

Plate 1 - A view of the oxidation ponds looking in a north-easterly direction across the Estuary.

Plate 11- A wetland area in the Pleasant Point vicinity.

absent or minimal and travel through or alongside these open spaces. In particular, the contrast the Estuary brings to the urban area gives it a high degree of amenity value and this is complemented to some degree by the presence of the oxidation ponds (Plate I) which impart a sense of distance and open character around the area.

The landscape and scenic elements of the Estuary and its environs include:

1) The aesthetic enjoyment obtained by watching the pattern of the changing tides, the colours of the tidal wetlands and the daily activities of birds and other animals.
2) Views across the water of the Canterbury Coastline and the hillside areas of Eastern Christchurch.
3) The broad scale of the visual scene across to the Southern Alps.
4) The extent and diversity of the natural vegetation margins that exist as the transition from aquatic to terrestrial zones takes place. (Plate II)
5) Views of many forms of water and land based recreation.

The beauty of this area is enjoyed by several major groups including:

1) Those who look upon the area from their homes.
2) Those who pass through the area on their way to or from work.
3) Those who drive in the vicinity for leisure.
4) Those who view the shoreline from the Estuary water while boating or yachting.
5) Those who use the shoreline for recreational purposes such as walking or relaxing.

So far, the nature and extent of the recreation resources of the Avon-Heathcote Estuary have been examined. In the

next chapter we consider the demand side of the framework which is shown in figure 3. In turning to the population side of the recreation equation, we move to a direct concern with the recreational behaviour of a sample of visitors to the Estuary during the summer of 1979.

CHAPTER 5: DATA ANALYSIS

The aims of this chapter are twofold; first, to describe the types and spatial distribution of recreational activities at the Estuary, and second to examine users' satisfaction with recreational experience and their attitudes towards the estuarine environment.

There are two main categories of recreational activity at the Estuary:

1) Individual or casual outdoor recreation

2) Club or organisational recreational use.

After a discussion of the patterns and extent of casual recreation, visitor characteristics are examined. In the second part of the chapter the nature of club/organised activity is explored. This is followed by a discussion of user attitudes and the compatability of recreational activities.

5.1 DEFINITIONS

Before moving on to an analysis of the survey data the nature and scope of the terms 'recreational demand' need to be considered.

Recreation incorporates many kinds of activities. In its widest sense, recreation means any activity (or planned inactivity) undertaken for pleasure. Recreation is not seen as being entirely synonymous with the term 'leisure'. Leisure can best be regarded as the time available to a person after the requirements of sleeping, eating, earning one's living, travelling and basic social and household duties have been met. Recreation centres on activity; leisure is best seen as a component of time (Burton, 1970). According to Clawson and Knetsch (1966), the distinguishing characteristic of recreation is not the activity itself but the attitude with

which it is undertaken. They conclude that when there is little or no feeling of compulsion or "ought to", an activity is almost surely recreation. In the present study, the term 'recreation' is largely confined to outdoor pursuits involving both active and passive forms.

Much vagueness surrounds the term 'demand'. Actual and latent demand, for example, are frequently confused in the literature. Actual demand has been discussed in some detail by Knetsch (1967). He claims that the terms 'demand' and 'consumption' have been continually misinterpreted;

> ".....The trouble arises from a confusion over the difference between demand and consumption. Use or attendance figures are incorrectly called demand, instead of being interpreted as consumption or the interaction between both demand and supply of opportunities".
>
> (Knetsch, 1967, 6)

Latent demand represents the unsatisfied need for particular types of recreation areas or facilities that are either inaccessible or inadquate in terms of present supply. Little is known about unsatisfied recreational desires and it is not easy to assess the character and extent of this suppressed demand (Rodgers, 1969). The term 'demand' also covers the wishes of those who merely want the satisfaction of knowing that a particular area or facility is there to be used and enjoyed by both present and future generations.

In the case of this study, the focus of the research has been on consumption of recreation resources as expressed in terms of demand for space and facilities. Latent demand is not examined.

5.2 CASUAL OUTDOOR RECREATION

The number of interviews completed between January 1st and April 15th, 1979, totalled 162. Of this number 12 have been excluded from the analysis, because of incomplete

schedules or respondents' refusal to be interviewed. A total of 150 completed questionnaires provided the data for the following analysis.

Types of Activity

Table 2 gives a broad view of the reasons cited for coming to the study area. The popularity of the area as a multiple use recreation resource is indicated by the overall spread of responses highlighting the area's appeal for both active and passive forms of recreation.

Table 2: Main reasons for visiting Estuary

Object	% of responding individuals (to nearest 1%)
Active	
Boating (including yachting, water skiing, powerboating, canoeing, rowing)	37
Fishing	15
Swimming	3
Others (horse riding, trail bike riding, wind surfing)	5
Passive	
Socialise/sunbathing/relaxation	12
Family Recreation/Picnicking	11
Birdwatching	1
Viewing other people's activities	12
Walking (fossicking for shells etc.)	6
Painting/Photography	2

Respondents were asked if they had or intended to indulge in other activities in addition to the main form of

recreation. The distribution of total activity preferences is hown in Figure 4. The figure shows that boating dominates the primary preferences of recreationalists. A clearer picture of these preferences is presented by breaking boating into two categories,

1) Non Powered Boating, which includes yachting, canoeing and rowing.
2) Power Boating including waterskiing and motor boat cruising.

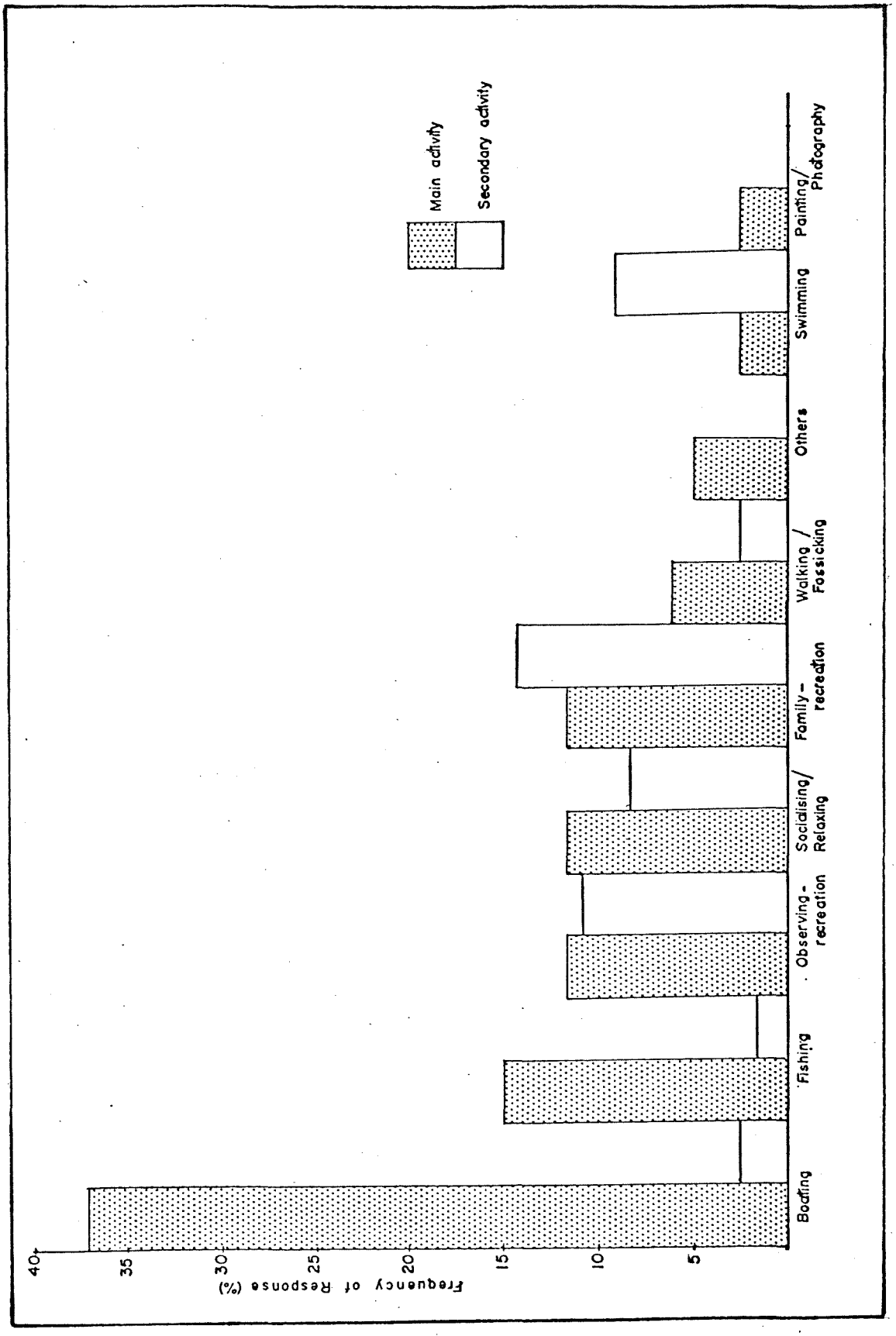
Within this grouping, non-powered boating accounts for 32 per cent of the sample as compared with 5 per cent for power boating. These results are not unexpected given the suitability of the Estuary for boating and the presence of three yacht clubs, which together places yachting as the single dominant form of recreation occurring within the Estuary. Observation and survey results indicate that powerboating and associated activities are minority pursuits except on special racing days such as the national A.C. Delco championships in which up to 100 boats use the Estuary in one day.

A major point arising from Figure 4 is the fact that over half (58%) of those interviewed claimed that they intended to participate in only one activity while at the Estuary. For instance, the majority of respondents who cited power boating, water skiing and yachting as their reason for coming to the Estuary did not mention any secondary activities. However, it became apparent that certain activities associated with water sports, such as sunbathing, relaxing and socialising, have been underestimated in the respondents' replies and hence in Table 2.

Frequency of visit

In order to gauge the popularity of the Estuary as a recreation vanue, a question was asked on the number of times

Figure 4: Activity Preferences



the respondent had visited the area in the last twelve months. The results are shown in Table 3.

Table 3: Frequency of visits to Estuary by % of respondents

Frequency	% sample population
1st visit	5
1-4	28
5-14	25
15-21	18
Over 21	30

It is evident that the largest single group of users of the Estuary are frequent visitors (more than 21 visits in the previous twelve months). The 30 per cent who used the area on more than 21 occasions in the previous year consisted mainly of yachtsmen who use the Estuary heavily in the summer period, and fishermen who frequent the area year round. From Table 3 it can be seen that over 65 per cent of visitors used the Estuary more than five times in the last twelve months. The frequency of use is partly explained by the distance factor, the Estuary being only 6.5 kilometres from the city centre. The area's proximity to a large urban centre offers the advantage of reduced travel time, distance and cost, and these advantages are expressed in the frequency of visits.

The frequency with which visitors use the area, together with the fact that 74 per cent of visits are planned, suggests that recreation visits to the Estuary are not haphazard but are usually planned on the basis of previous knowledge and experience of the area.

With rising fuel prices the proximity of the Estuary to a large urban population is likely to make the area an increasingly popular venue for recreation. Mercer in a

discussion on coastal recreation argues that:

> '.....accessibility is the first and probably the most important factor accounting for the popularity of coastal recreation sites. It could be said that this variable is even more important than physical attractiveness, for in general people will tend to use a close unattractive site rather than a distant attractive one'.
>
> (Mercer, 1972, pg. 35)

Timing of Visits

The extreme time-peaking of recreation demand is one of the most serious economic and management problems in recreation planning (Clauson and Knetsch, 1966). This is particularly obvious in national parks and coastal sites where recreation is restricted by climate and other conditions to a relatively short period of the year. Within an estuarine environment activities are limited by the additional influence of tides.

An examination of the timing of visits to the Estuary reveals some interesting variations in recreation behaviour arising from such factors as climate and contemporary social patterns.

Climate is undoubtedly the overriding factor influencing the timing of recreation at the Avon-Heathcote Estuary. Around this factor the daily and seasonal patterns of use are determined. The summer months absorb 75-80 per cent of activity in recreation. The form of recreation that makes up this percentage is significant in that it includes mostly water related activities which are not suited to the cold Christchurch winter. Similarly, daily patterns in recreation use vary according to the weather. The warm sunny summer's day promotes the heaviest use of the study area.

Recreation is most concentrated in weekends and certainly on Sundays. From the sample, 20 per cent of those contacted claimed that visits to the Estuary were in weekends, while

Sunday accounted for 37 per cent of all visits and Saturday 22 per cent. It is expected that weekends attract the largest number of users as this is the time when organised recreation, such as competitive yachting and powerboating, takes place. Generally, Saturday's attendance at outdoor recreation areas is less than that occurring on Sundays (Patmore, 1972) (Boden et al, 1973) and reflects existing social patterns, including tendency for Saturday mornings to be the dominant period for overtime, a high level of involvement in organised sport, and a trditional pattern where the first day of the weekend is devoted to home-care activities. Recreational use of the Estuary during the working week was minimal with only 13 per cent of the sample reporting use of the area during the week.

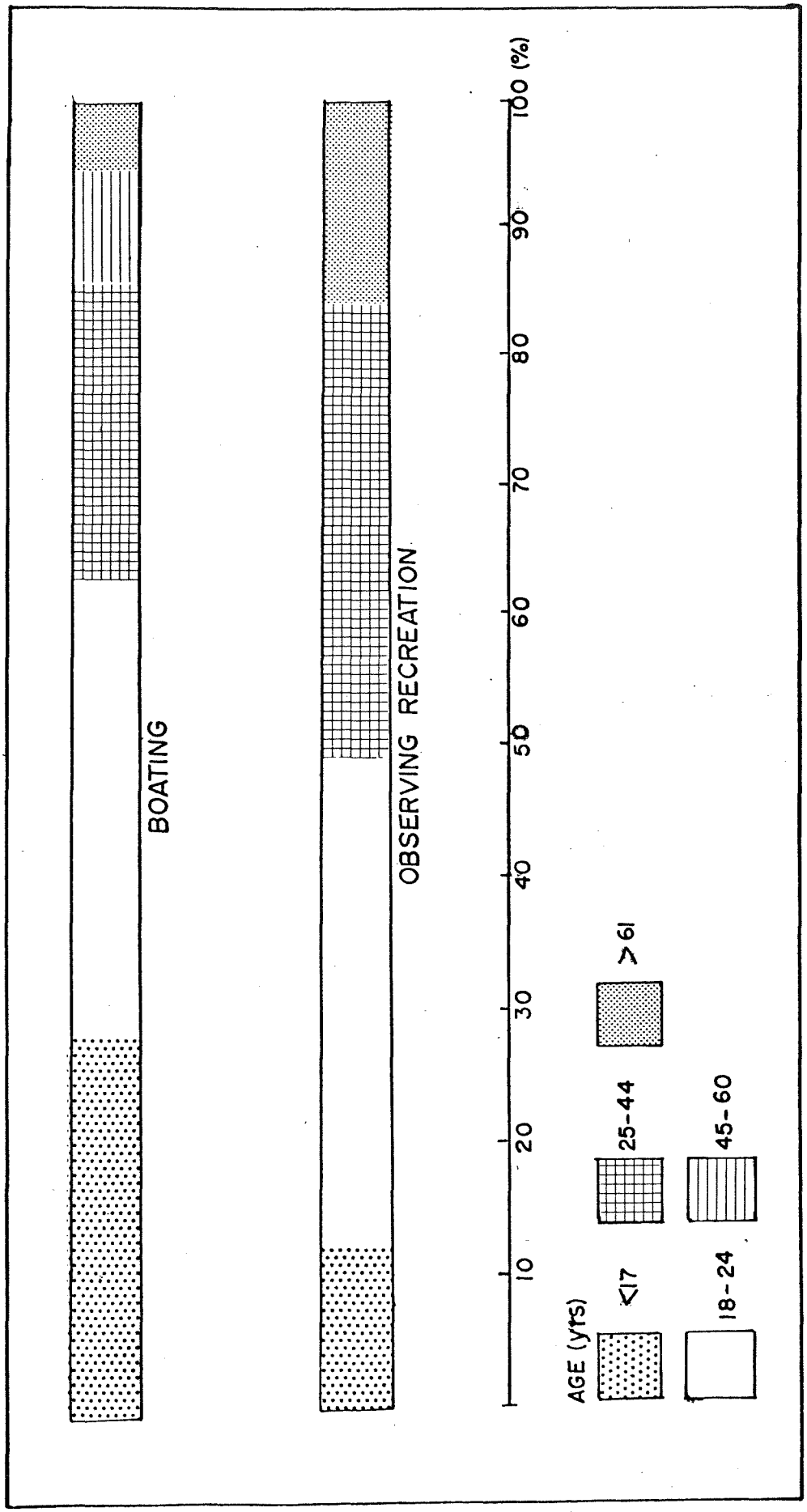
5.2.1 Visitor Characteristics

Apart from assessment of levels of demands for each activity, factors that influence these demands must also be looked at. However, before such an analysis can be carried out some knowledge of the use population is required.

Age distribution

The distribution of users' ages is plotted in Figure 5. It is evident that the majority of users (75%) occur in the 15-44 age group, hence the predominance of active recreational pursuits shown previously. An analysis of sex and marital status of participants indicates that the proportion of female visitors (58%) is slightly above that of male users (42%). The dominance of females is partially explained by the tendency for male members of a group to be actively involved in recreation which frequently meant that only the female member of the group could be interviewed. The question of marital status of participants revealed an equal distribution between married

Figure 5: Influence of age on boating and observing recreation



(44%) and unmarried (47%). When considered collectively, the analysis of user characteristics illustrates the appeal the study area has to a wide range of people. However, in an attempt to determine the factors that influence the demand for activities it is necessary to consider separate activities in more detail. According to Figure 4, the activities which warrant further analysis are boating, fishing and observing recreation.

Chi-square tests were computed between the dependant variables of boating, fishing and observing recreation, and the independent factors of age, sex, marital status and the number in visiting groups. Results of these computations showed no relationship between fishing and observing recreation and marital status and sex. However, significant relationships (at the .001 level) were discovered between boating and age and sex groups, observing recreation and age, as well as fishing and the numbers in visiting groups at the 0.01 level. Figure 5 illustrates the relationship of activities with age, with younger users showing a preference for boating, while older visitors have a preoccupation with observing other people's activities.

Origin of visitors

The advantages of location make up 24 per cent of the response to the question of attraction of the Estuary as a venue for recreation. The location of respondents in terms of distance from the Estuary is shown in Figure 6. As expected, there is an obvious spatial bias in the distribution of respondents resident in Christchurch with the majority of users (68%) living within 9 kilometres of the Estuary. From Figure 6 it is evident that the number of people using the Estuary for recreation decreases as distance from the

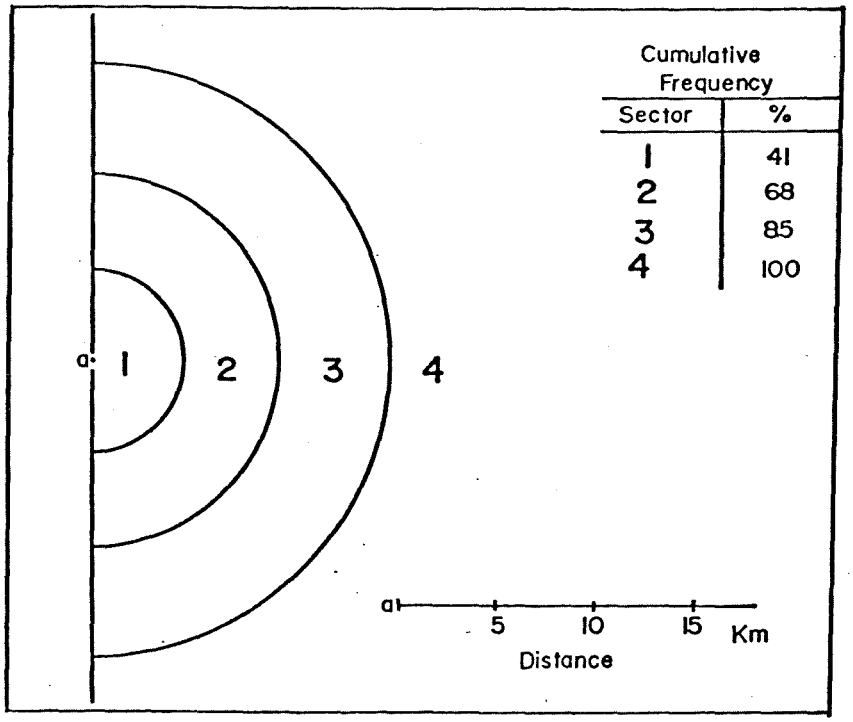


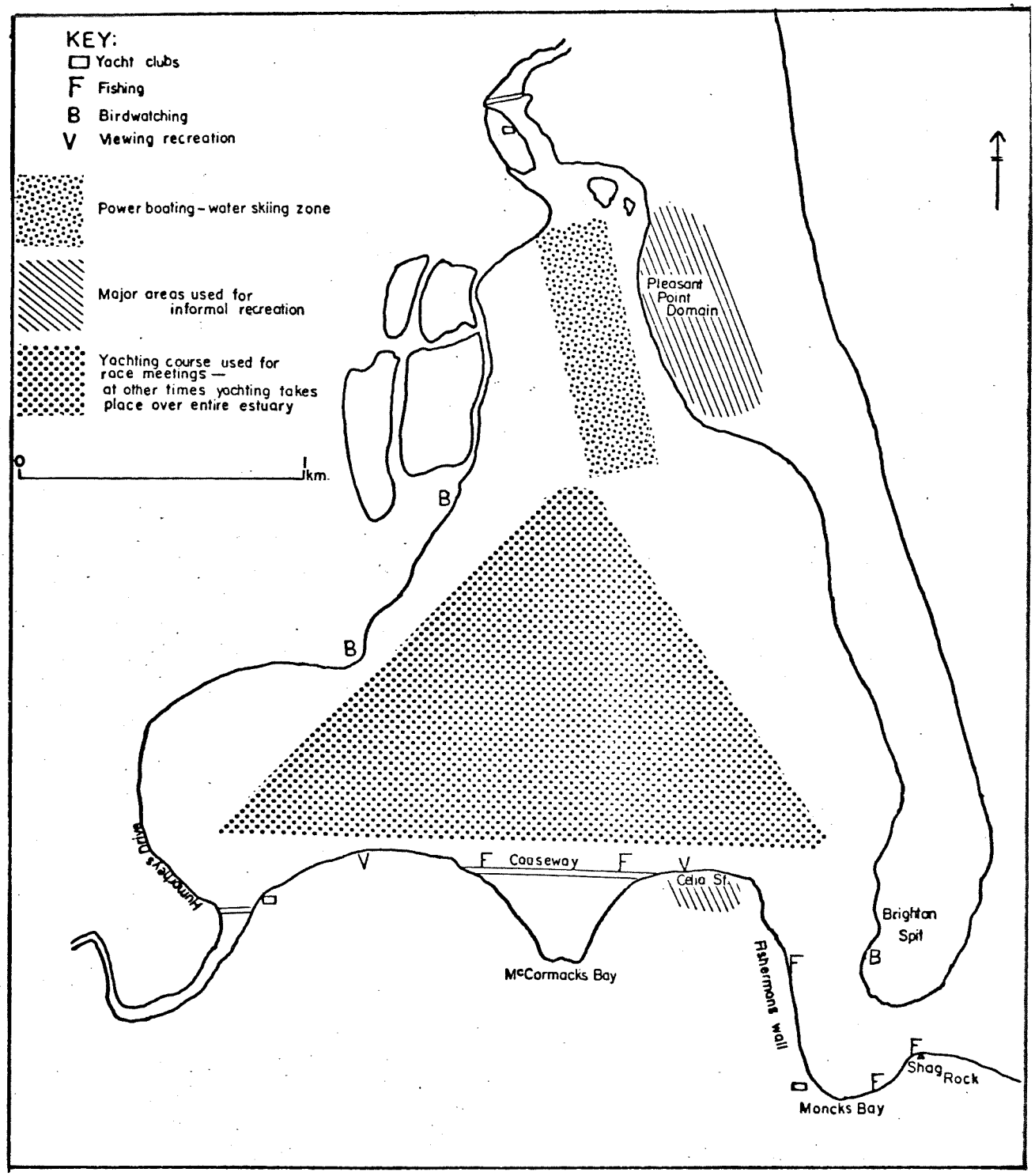
Figure 6: Influence of distance on recreational use of the Estuary

area increases. It appears that the attractive power of the area is confined to those areas located in the vicinity of the Estuary. This is supported by the marked sectoral bias in the distribution of respondents resident in Christchurch, with over half (56%) the sample located in the South Eastern corner of Christchurch. These results tend to confirm the findings reported by Cracknell (1967) and Mercer (1971), both of whom have emphasised the overriding importance of accessibility in influencing recreation patterns near urban areas.

5.2.2. Distribution of demand and activity characteristics

Levels of activity and the influence of user characteristics on resource demands, have little direct application without an analysis of the spatial distribution of demand for recreation resources. This is done by comparing lack of demand with

Figure 7: Distribution of Recreational Activity



their distribution around the Estuary. The following section examines the distribution and characteristic of recreational activity within the study area. For the numerically most important activities, case studies, which are thought to represent typical user groups, are discussed to highlight the appeal of the Estuary for particular forms of recreation.

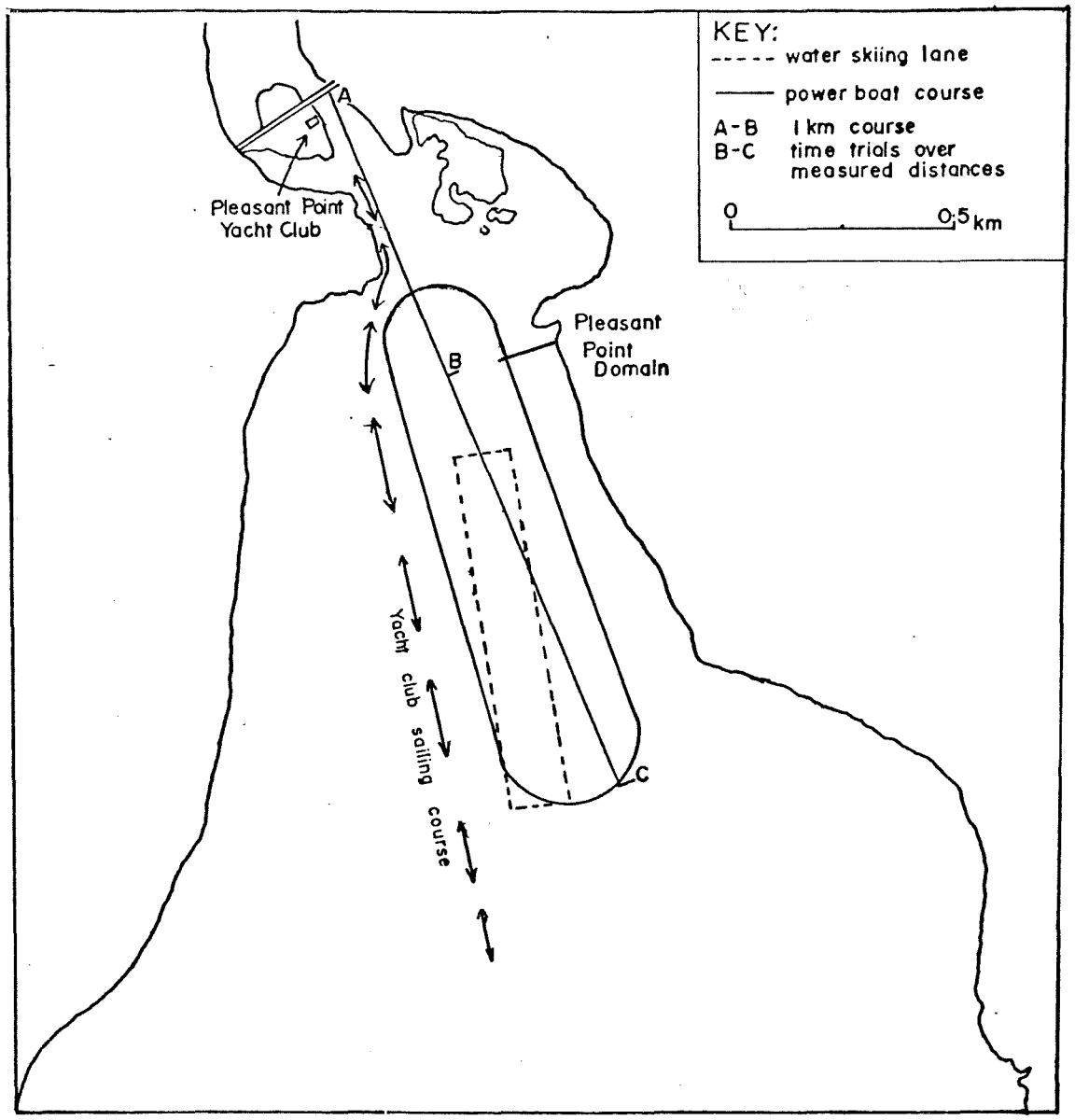
From Figure 7 it is apparent that recreational use of the Estuary is highly localised in character. That is, people using the area do so in localised spots and the site chosen largely reflects the particular activity being carried out, and the facilities/resources necessary for use. This is particularly the case with activities requiring special conditions, for instance, power boating and ornithological activities. However, unless special requirements are needed, weather conditions and the popularity of specific locations would then dictate use patterns.

Boating

The main recreational activity for which the area proves popular are the various types of boating, i.e. yachting, power boating, rowing and canoeing. These user groups, when combined with water skiing, accounted for 37 per cent of the activities cited by respondents. Boating on the Estuary falls into two distinct categories. First, competitive boat racing for power boating and yachting, both of which provide popular attractions, a section of study to be expanded in section 5.3. Secondly, informal boating, which refers exclusively to those activities which are carried out for recreational purposes. This category includes the wide range of recreation activities associated with powered and non-powered boats.

The recent imposition of a 16 Km/hr speed restriction for the Estuary has meant that most power boating and water

Figure 8: Area zoned for power boating and water skiing



skiing (94%) is restricted to the zoned region adjacent to Pleasant Point (see Figure 8). The remainder of users in the power boat category included fishermen or family recreation groups scattered around the Estuary. Yachting and other non-powered craft are free to use the entire estuary, with the exception of restriction of access into ski lanes. Interviews and direct observation revealed no distinctive usage patterns, except on race days where well defined courses were used.

Case Study A - Water skiing

This particular group of recreationalists consisted of family and friends and included four adults (25-44 age category) and three pre-school age children. While the interview was in progress the respondent indicated that her husband and youngest son were riding in the boat drawing a waterskier. Picnicking and sunbathing were other activities which would be followed when the remainder of the group returned from water skiing. The Estuary was seen to be an attractive venue for recreation because it was not necessary to spend the entire day there. The Estuary could only be used for water skiing at 1½ hours before and after the high tide. This allowed for 2-3 hours for recreation and left the remainder of the day free to perform other tasks. Dissatisfaction with the estuarine environment was mentioned because of "foam" which accumulates around the Drainage Board's sewage outlet on shoreline opposite the Pleasant Point recreation area. The Estuary experiences greatest recreational use at high tide; unfortunately this is the period when foam accumulates as treated effluent is discharged at each cycle of the high tide.

Fishing

Fishing remains a popular form of recreation within the Estuary and the response from those interviewed suggests an

Plate 111 - Fishermans Wall - A popular fishing area

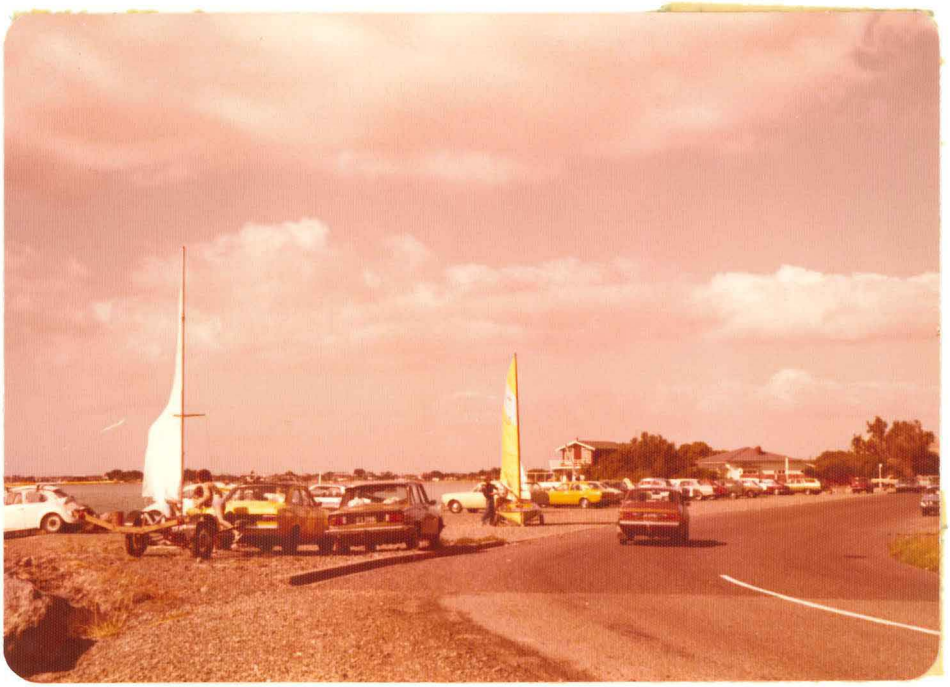


Plate 1V - Celia Street slipway - A focal point for informal recreation at the Estuary

increase in the popularity of this sport as water quality continues to improve. The majority of fishing (84%) occurs along the southern shores of the Estuary, the most popular sites being Fishermans Wall (36%), Shag Rock (22%), McCormacks Bay (11%) and along the length of the causeway (see Plate III). The majority of individuals fishing (58%) were part of family groups containing children under school age. From the interviews, 'the safety factor' was the most frequent response (46%) given to question asking why respondents chose the Estuary as a venue for fishing. The safety factor was due to low risk of injuries and the ease with which children can be supervised. Also, the variety of fish which can be caught, including mackerel, herring, flounder, kawhai, is also important in attracting fishermen to the Estuary.

Case Study B - Fishing

The two individuals chosen for this study were located at Fishermans Wall which borders the shoreline along Beachville Road. When questioned on their reason for choosing this particular area, both agreed that 'Fishermans Wall' was the best spot for fishing within the Estuary, not only because of the variety of fish but also the numbers caught. Asked how frequently they use the Estuary for recreational fishing the younger of the two respondents claimed to have visited the study area only about a 'dozen or so times in the last twelve months'. His companion, however, maintained that he used the Estuary at least once a week in the summer and made 'several visits during winter'. The attraction of the Estuary as a venue for fishing was the 'peace and quiet' it afforded and its proximity to place of residence. Being close to home it meant that it was not necessary to spend the entire day at the Estuary. Both men viewed the Estuary as a satisfying

recreation environment. One voiced the opinion that yachtsmen, from the Christchurch Yacht Club, did at times come too close to shore and on one occasion actually cut across his fishing line. However, it was generally felt that the study area was an attractive location for recreational fishing.

Picnicking/Family Recreation

The passive forms of recreation such as sunbathing, swimming, socialising and viewing other forms of recreation together made up nearly 40 per cent of the total activity taking place in the study area. These activities were largely centered at the northern end of the Estuary at Pleasant Point. This area is particularly suitable for picnicking, and other forms of family recreation as often when conditions are, or become, unsatisfactory for recreational activity at New Brighton Beach for example, the Pleasant Point region remains relatively sheltered. The area also contains barbeque and seating facilities and the numerous trees available afford privacy and shade, both of which make the area an attractive site for passive forms of recreation. Several other locations around the Estuary, such as the grass verges adjacent to Beachville Road and the area in the Celia Street vicinity, provide the opportunity for informal family recreation.

The advantages of the areas mentioned above are that they incorporate a land/water interface, thus providing an ideal and safe playground for family activities usually taking the form of sunbathing and picnicking near the car; ball games (soccer, cricket etc.); exploring the beach; or merely relaxing by watching other forms of recreation.

Case Study C - Family recreation

The pier attached to the Christchurch Yacht Club is the location at which the interview which provides the basis of the following case study was undertaken. The group, including mother-in-law (51), mother (32) and three shcool aged children, was chosen because it was felt that the activities they pursued and their opinions of recreation at the Estuary, were typical of a majority of recreationalists involved in family recreation. The activities followed by the group included swimming, snorkeling, canoeing, fishing and relaxing in the sun. Most of these activities were undertaken during the summer when visits to the study area were made on both weekdays and weekends.

The major attraction of the Estuary for this group of users is its usual appeal. Its 'rugged appearance' and the pleasure obtained from watching other people enjoy themselves make the area 'visually very satisfying'. Other features of the Estuary which make it attractive for recreation are that it provides entertainment for all the family and secondly it is not essential to devote the entire day to recreation.

A major concern of the group was the desire to retain the 'naturalness' of the Estuary and to this end, they claimed they would object to any development of recreational facilities which would threaten the natural character of the area. The need of a pedestrian crossing in the vicinity of the Christchurch Yacht Club was emphasised. The volume of traffic using the Main Road together with the bends in the section of the road approaching the Yacht Club made the crossing of the road very treacherous, especially in summer.

Case study D - Observing recreation

A popular form of recreation among those visiting the Estuary is the viewing of other people's activity. For Group

C the main reason for visiting the Estuary on this occasion was to watch their son race in a yachting competition. After the racing had finished the family group, consisting of parents and two school aged children, intended to have lunch in the park adjacent to the Celia Street slipway. The water body was singularly the most important attraction of the Estuary. In the respondents' words 'the contrast provided by the water, at one time the peacefulness and serenity of a yacht gliding across the water contrasted with the struggle of yachtsmen fighting against winds tides and currents' is particularly appealing. For this group, the advantages of using the area for recreation are twofold. Their proximity to the Estuary - the car is not essential when visiting the area. Secondly, social forces is an important element in the recreational visit. Many neighbours also use the Estuary for recreation. Thus while using the area both parents and children have the opportunity to socialise with friends and acquaintances. The Estuary is a focal point for much of the recreational activity of this group and is used at least once a week during the summer months but less frequently in winter. The respondents were satisfied with the recreational environment and said that they would like to see the Estuary kept in its 'natural state'. They had little desire for any additional facilities or amenities, nor did they report any conflict between themselves or other recreational users. Although aware of the existing conflict between power boating and yachting, they did not consider it dangerous to their son's yachting, nor did it detract from their enjoyment of the Estuary.

Minor activities

Other activities in the area are of less significance at least in terms of numbers involved. Examples here are

swimming, walking, ornithology, horse riding, canoeing and wind surfing. Swimming is not a popular activity in the area. Survey results show that it is a secondary activity, occurring in conjunction with activities such as picnicking and yachting. The quality of water probably has some effect on the numbers using the study area for swimming, but it must also be realised that the Estuary cannot compete with the adjacent beaches along Pegasus Bay.

Walking in the area would appear to take many forms, such as merely strolling along the shoreline observing other people's activities, walking dogs and foraging for shells along tidal mudflats at low tide, especially with young children. Nearly 80 per cent of those who reported walking/strolling as a primary or secondary activity used the tidal flats adjacent to Estuary Road and South Brighton Spit. This area is the zone in which birdwatching activities are undertaken. Other areas used for this activity include the lower reaches of the Avon and Heathcote Rivers as well as McCormacks Bay and the paddocks and foreshore adjacent to the Christchurch Drainage Board's oxidation ponds.

Conclusions

Casual use patterns for recreationalists seem to vary according to their activity. The majority of recreationalists use the facilities several times per year, few people making light use of the area and many using it very heavily. Usage of the Estuary would seem to fall under two categories a) the main location for family recreation or b) for purposes of a regular alternative to other recreational focal areas that family groups and others may use. Over 60 per cent of respondents claimed to have visited the Estuary on more than five occasions in the previous year. This is a considerable

participation rate in view of the seasonal nature of use, and has serious implications for carrying capacities and facilities in the area. The significance of the capacity concept is examined in Chapter Six.

There is a marked degree of seasonal recreational use of the area. Summer activities, especially those associated with water sports, in the area are obviously limited outside the period October to April because of climatic limitations. This is strongly reflected in patterns of use. Other recreational pursuits, for instance walking and fishing, make up the bulk of the all year round use in the area. Apart from those activities with specific requirements, pressure from visitors is concentrated in summer and especially on weekends.

5.3 CLUB/ORGANISATION OUTDOOR RECREATION IN THE AREA

Analysis of recreation resource consumption also necessitates examination of organised or club activities within the study area. The types of activity involved are extremely varied but the distinctive characteristic is that they are all carried out under the jurisdiction of sporting clubs or other organisations. The amount of club/organisational activity in the study area is significant in terms of the variety, the area and the numbers involved. Of those clubs and organisations using the Estuary, only the yachting clubs own freehold land on which members have constructed clubrooms and launching facilities.

The information on present recreational use of the area by clubs and organisations in all forms was obtained from informal interviews with representatives of each group. In some cases groups preferred to refer the matter of answering the questionnaire to committee meetings, and as such postal contact was necessary.

Table 4 shows that the majority of clubs/organisations in the area have memberships that are increasing. Two groups, the New Brighton Power Boat Club and the Estuary Watersports Association, had a declining membership.

Table 4: Memberships patterns for clubs/organisations using the Estuary

	Decreasing	Stable	Increasing
Mt. Pleasant Yacht Club			X
Pleasant Point Yacht Club			X
Christchurch Yacht Club			X
New Brighton Power Boat Club	X		
Estuary Watersports Association	X		
Royal Forest & Bird Society		X	
Ornithological Society			X
Sumner Art Group			X
Sumner Scout Group			X
Pegasus Sea Scouts/Cadets		X	
Acclimatisation Society			X
Walkways Association			X

The clubs stimulate participation in outdoor activities by providing greater opportunity for involvement in recreation in the form of organised meetings. Furthermore, greater control and coordination of recreation results from programming and zoning of organised activity within the Estuary. Employment of zoning and time tableing allows for greater use of the water body, in terms of numbers participating as well as permitting less compatible activities, such as water skiing and power boating, to be pursued. The zoning principle is an important concept in dealing with recreational use of finite resources, a matter which will be dealt with further in Chapter Six.

Seasonal characteristics

The timing of club/organisation use of the Estuary is similar to that of informal activities identified in section 5.2. Of those twelve club groups using the study area for recreation only the Acclimatisation Society, Sumner Art Group, Pegasus Sea Scouts and Walking Association members use the Estuary year round. For the remainder of those groups listed in Table 4, use at the study area is restricted to the summer months when conditions are favourable for water based recreation. Restrictions on use may also be brought about by the fact that certain resources are available only at certain times of the year. Consequently, the Ornithological activities in the area are concentrated in summer when migratory bird species are present.

Characteristics of usage

Yachting

The three yachting clubs situated on the foreshore of the Estuary provide the focus for much of the recreation in the area. The clubs, for instance, besides organising yacht racing on most summer weekends, are an important venue for group gatherings and socialising after races have been completed. Exact figures on membership numbers of the yachting clubs are difficult to obtain as family groups are included, many of which consist of more than one 'active user'. However, information obtained from the various clubs would place the total club membership at approximately 700. Each of the clubs arrange competition for many different classes of yachts ranging from the 2.3 metre Optimists to the 6.3m Sigrid trailer yachts. On a few occasions each year the various clubs combine to compete in events such as the Estuary Pennants involving up to 200 yachts (see Plate).

The activities of these clubs are not solely restricted to organisation and supervision of race meetings. The clubs carry out an important role in the instruction of inexperienced yachtsmen. For instance, the Pleasant Point Yacht Club arranges a series of lectures dealing with water safety and boating in general, which are open to the public. The same club runs weekend camps for learners who are put through accuracy tests and time trials to assess and improve individual skills.

Patmore (1972) notes that the most rapid rates of increase in recreation are in those activities of a more sophisticated nature. Included in this category are the various forms of water based recreation. Therefore, as the growth of the more demanding (in terms of equipment required) forms of outdoor recreation continues, water based recreation can be expected to experience at least part of this growth. The increase in membership of the Christchurch, Pleasant Point and Mount Pleasant Yacht Clubs alludes to the increasing popularity of yachting in Christchurch today. It is suggested that this may be a reflection of the increasing costs of fuelling power boats. Yachting provides a desirable and viable alternative boating sport to many would-be power boaters. Therefore it is expected that demand for this activity will continue to advance and this has important implications for future use of the Estuary, especially when we consider that membership for two of the three yacht clubs is bordering the limit with which the clubs can cope with in terms of the facilities and space they have available at present.

New Brighton Power Boat Club

The New Brighton Power Boat Club established in 1890 has long been an important user of the Estuary for recreational

Plate V - Pleasant Point - A popular walking area

Plate VI - A race day scene at the New Brighton Power Boat Club headquarters at Pleasant Point

purposes. The club carries out various forms of racing on the section of water adjacent to the Pleasant Point domain. The club has a total membership of 232, although membership for the 1978-79 season was somewhat lower than that of the previous season. Race meetings occur on about 10-12 occasions between the months of October and March. On approved race days, by-laws established by the Christchurch City Council give the power boat club exclusive use of the area shown in Figure 8. The power boat club is host to one national event each year. The main attraction of the 1978-79 season was the staging of the A.C. Delco Championship meeting. During the meeting nearly 100 boats participated in a series of events which attracted over 5,000 spectators (Plate 1V). The activities of the New Brighton Power Boat Club are solely restricted to the Estuary as there are no other suitable bodies of water within the Canterbury region.

Estuary Watersports Association

The Estuary Watersports Association, established in 1973, consists of 42 family memberships, the majority of which have used, or currently use, the Estuary for water skiing. The Association's primary purpose was to co-ordinate opposition to a proposal to introduce a 16 Km/hr speed limit over the entire Estuary which would have effectively prevented water skiing within the area. The opposition to this proposal prompted a compromise in which the City Council established a ski-lane which has recently been moved to the northern part of the Estuary adjacent to Pleasant Point (Figure 8). The association does not provide any organised activity and as such water skiing in the Estuary is largely uncontrolled. The indiscriminate use of the study area by individual water skiers has generated conflict between this group and the

majority of other users of the area.

Wildlife organisations

The Avon-Heathcote Estuary provides a unique opportunity for the study of wildlife within an urban environment. Members of the Ornithological, Acclimatisation, Royal Forest and Bird Societies and the Sumner Art Group use parts of the Estuary for some portion of their particular group's activity.

Meaningful figures on use are not possible to obtain because, with the exception of the Art Group, the amount of organised activity is slight compared with the groups already discussed. The Sumner Art Group membership has doubled in the last four years and current numbers are approaching 60. The activities of the group, which includes most arts and crafts, except photography, occur all year round. The group occasionally arranges day outings to locations outside the Christchurch region; however members are frequently located on the perimeter of the Estuary where the attractiveness and diversity of landscapes enable the members to express themselves in the form of sketches, painting or sculpture.

The Ornithological Society (membership 300) and the Royal Forest and Bird Society (membership of 1700 plus) are keenly interested in the Estuary bird life both in the estuarine habitat and adjacent surroundings. Members use the area all year round for wildlife studies. Heaviest use is during the summer months when migratory species are present. The Ornithological Society provides a useful function for other agencies in that it furnishes them with information as to the various bird populations in the area. The members of this society are more actively involved in birdwatching compared with those in the Forest and Bird Society, the majority of whom are sympathetic members not actively involved in

ornithological activities.

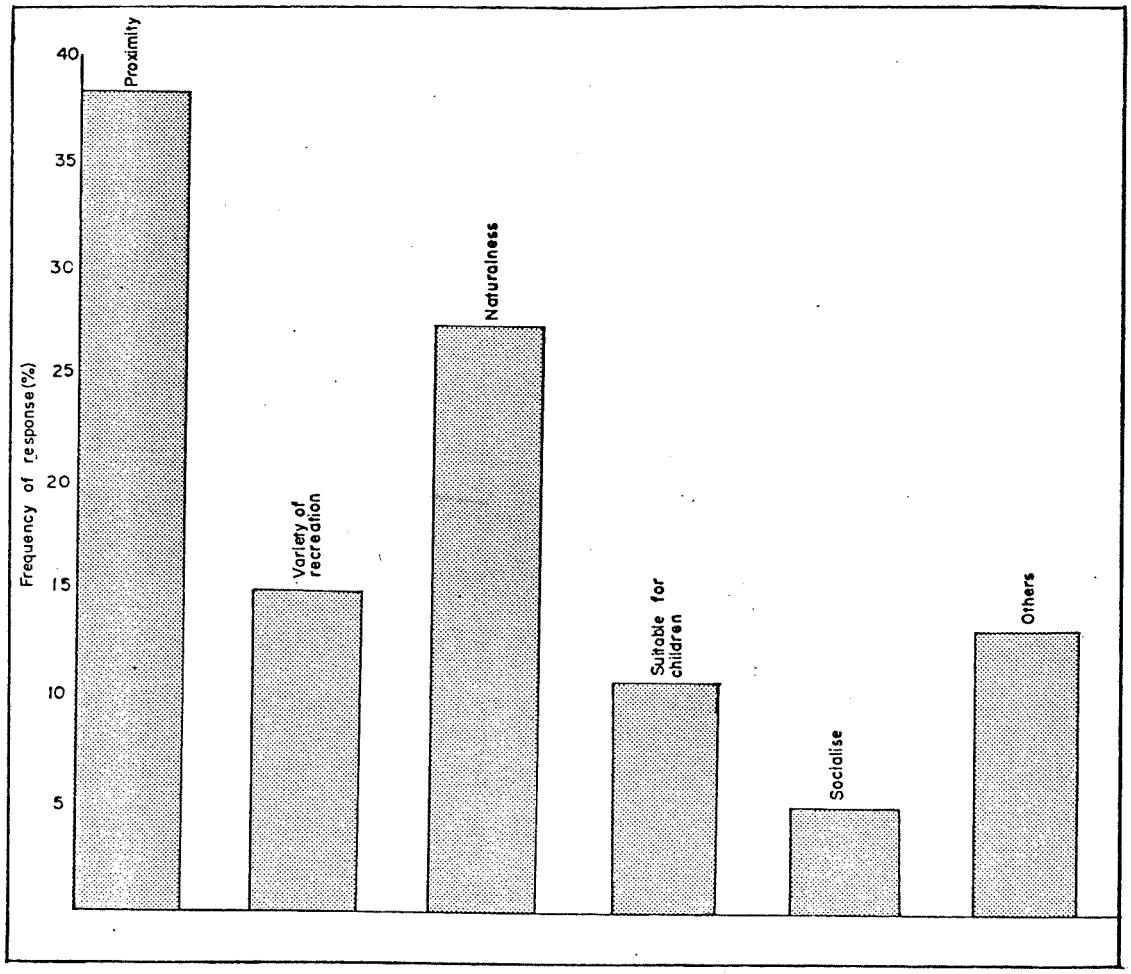
Scout Groups

Several of the scout groups from eastern Christchurch, including Pegasus Sea Scouts, Boy Scouts and Navy Cadets from the Training Ship Cornwall, use the Estuary for training and recreational purposes. Sea Scouts and Navy Cadets, for instance, use the area for development and testing of seamanship skills such as rowing and water safety. The Boy Scout group also use the area as a training ground, their annual event involving a raft expedition in which members are involved in the preparation, building and launching of a seaworthy raft.

5.4 RECREATIONAL QUALITIES OF THE ESTUARY

Users were asked what factors made the Estuary appealing as a venue for recreation. The significant attractions are shown in Figure 9. It is evident that the proximity of the Estuary in relation to their place of residence is an important consideration for a significant proportion (38%) of users. Comments relating to the naturalness of the area, such as 'visual appeal' and 'peace and quiet' were of importance to 27 per cent of the sample population, while the variety of recreation opportunities available were mentioned by 15 per cent of those interviewed. In light of the rising cost of recreational travel it is not surprising that proximity is cited as the most important factor in attracting visitors to the Estuary. Equally significant is consideration given to the naturalness of the area. In so far as the quality of recreational experience stems directly from the quality of the environment, the preservation and enhancement of this appeal should be of high priority in the management of the Estuary. However, the continued rise in fuel prices suggests

Figure 9: Recreational Qualities of the Estuary



the location factor will become more important in influencing recreationalists' choice of venue. The situation would point to an apparent conflict in the near future as, on one hand, there exists the need to preserve the estuarine habitat for users' enjoyment, but on the other the prospect of increased usage could damage the environment which recreationalists seek and enjoy.

Attitudes towards the environment.

Given the need to incorporate public attitudes into recreation planning (Oriordan, 1971), the survey included questions designed to collect spontaneous and unstructured responses to both satisfactory and unsatisfactory elements of the recreation environment. Respondents were initially asked if they were satisfied with the recreation environment. Seventy one per cent replied in the affirmative, while the remainder claimed that they were not satisfied.

The factors that significantly detract from recreational satisfaction of the Estuary are shown in Figure 10, and include water quality, the foreshore around the Estuary which is not satisfactory because it is littered with debris such as old car bodies and large boulders, McCormacks Bay which produces unpleasant odours as sea lettuce decays in summer, overcrowding and the quality of facilities available.

Examining the comments of the respondents with regard to these factors it is worthwhile noting that those concerned with water quality attributed this state to pollution. Although small concentrations of industrial and domestic pollutants continue to be discharged into the Estuary the water quality has improved to the extent that it no longer poses a threat to physical health. According to Knox (1972) the water discolouration can be partly attributed to the turbidity of

Figure 10: The Estuary: Factors detracting from Recreational Use

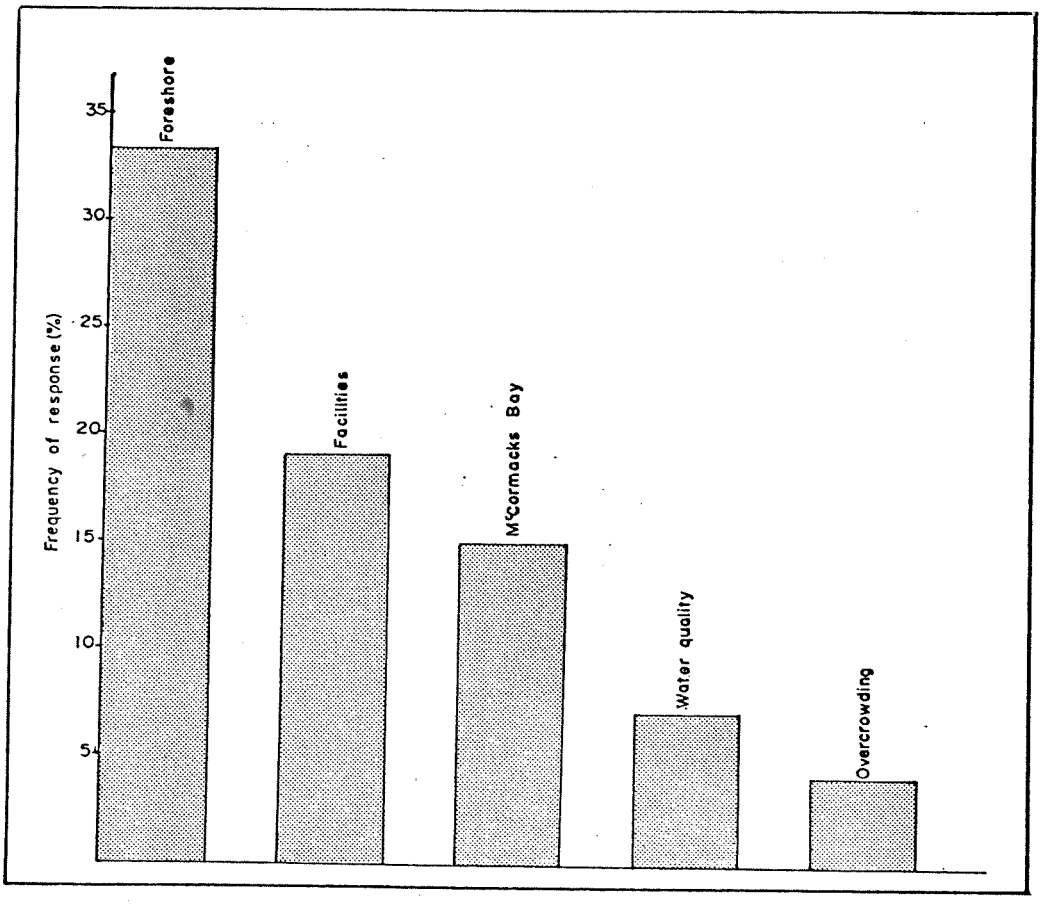


Plate Vll - A section of the foreshore adjacent to the Pleasant Point yacht club

Plate Vlll - Sea lettuce at McCormacks Bay

water currents.

It is evident that the overwhelming concern of users is with the physical estuarine environment and surrounding areas. Of particular concern is the state of the foreshore, especially areas adjacent to Pleasant Point Yacht Club and the Christchurch Drainage Board's oxidation ponds. In both locations large masses of boulders and rubble disfigure what could otherwise be an attractive setting. Other factors mentioned by respondents included sea lettuce problem in McCormacks Bay and the unsightly power poles scattered along the Causeway (see Plates Vll and Vlll).

The problem of overcrowding is largely restricted to Pleasant Point and an area adjacent to Celia Street launching ramp. These two locations are the most popular among members of the public and on warm summer days both venues are used for a variety of recreation pursuits. The problem of overcrowding refers largely to congestion that occurs around launching ramps at both locations.

Visitors to the area were asked whether they were satisfied with the facilities available or if there were any changes they would like to see made. Sixty two per cent of those contacted expressed satisfaction while the remainder indicated that some changes were desired. Those who were dissatisfied were asked to specify the types of changes they felt would improve the area. The results are illustrated in Table 5.

Although as many as 17 changes were listed, the frequency of certain changes desired made it possible to broadly classify the types of changes desired into three categories; these were:

1) Safety
2) Amenities and
3) Facilities

Table 5: Changes desired to Avon-Heathcote Estuary

Percentage of Visitors

Safety	**22%**
- Cars prohibited from public areas	7%
- Policing of zoning	12%
- More parking facilities	3%
Amenities	**62%**
- Shelter and shade	8%
- Landscaping of public areas	12%
- Toilets/changing sheds	7%
- Barbeque and seating facilities	19%
- Litter bins	4%
- Improve Access to foreshore	4%
- Improve foreshore	8%
Facilities	**15%**
- Refreshments located nearer Estuary	4%
- Additional launching ramps	7%
- Boat hire	2%
- Additional storage facilities	2%

The need felt for safe enjoyment of the Estuary confirms very much what the case studies (see section 5.2.2) say about conflicting interests. Most of the replies in this category emphasised that zoning was not entirely effective at present and that some enforcement of zoning regulations, especially for water skiers, was necessary.

The major concern over amenities is based on the sparse unlandscaped areas at Beachville Road and Celia Street and the lack of amenities for family based recreation. Although the Christchurch City Council had recently provided barbeque and seating facilities at Pleasant Point and at Beachville Road they were not sufficient to cater for the large numbers of people using these locations during the summer.

Although nearly 40 per cent of those contacted expressed some dissatisfaction with the recreation environment, nine out of every ten interviewed claimed that they would revisit the Estuary. This suggests that sufficient enjoyment is obtained from recreation in the area even though conditions fall short of the ideal.

5.5 CONFLICT BETWEEN RECREATIONALISTS

The increasing tendency toward recreational activity, shown by the rising club membership, has placed a heavy demand on existing facilities and has also created a shortage of some recreational facilities during peak holiday periods. Not only is there a strain on environment and facilities, but at times strained relationships between recreationalists using the area.

Conflicts among users have arisen mainly due to the fact that the needs and social objectives of different forms of recreation are immensely varied. Some users, such as bird watchers, prefer solitude, while others, like water skiers,

thrive on social contact. Some, like painting and other passive forms, are appreciative while others, such as fishing, are consumptive. Given such a diversity of uses it is expected that different forms of recreation show varying degrees of compatibility with others. Figure 11 presents an analysis of compatibility of the use of the Estuary for various water related activities. The majority (87%) of respondents who reported conflict from other users were located in the northern part of the Estuary in the Pleasant Point vicinity. The remainder of the Estuary was relatively free from conflicts. Thus Figure 11 presents an analysis of compatibility of use of this area for various water related activities.

COMPATIBLE ✓ NON-COMPATIBLE - X	Yachting	Fishing	Canoeing	Rowing	Swimming	Power Boating	Water Skiing	Birdlife	Onshore Recreation
Yachting	·	✓	✓	✓	✓	X	X	✓	✓
Fishing		·	✓	✓	✓	X	X	✓	✓
Canoeing			·	✓	✓	X	X	✓	✓
Rowing				·	✓	X	X	✓	✓
Swimming					·	✓	✓	✓	✓
Power Boating						·	✓	X	X
Water skiing							·	X	✓
Birdlife							X	·	X
Onshore Recreation									·

Figure 11: Estuary recreation - compatible uses of water

The major conflict among recreationalists results from the fact that the New Brighton Power Boat Club, Pleasant Point Yacht Club and water skiers use a common body of water. The

limited water area in the northern part of the Estuary frequently results in the perceived space requirements of users exceeding the actual space available.

Members of the Pleasant Point Yacht Club assert that the channel left between the shoreline and powerboat activities is dangerously narrow and shallow. Figure 8 shows that yacht access to the Estuary is restricted to a channel of approximately 20 metres in width. Due to the nature of progress in a sailboat, sailing courses cannot be defined on a map as a single line, especially when crosswinds blow from the southwest and northwest. Furthermore, the shallowness of the water which the yachties are required to use is unsatisfactory for yachting, as boats are required to lift their centreboards, thereby reducing control of the yacht. Although the Power Boat Club and the Pleasant Point Yacht Club are being tolerant with regard to a common stretch of water, the arrangements appear far from satisfactory. In the past, power boats had delayed their starts to let yachts sail safely out into the Estuary, but because of the rise in yacht numbers the power boat club may not be willing to wait the 30 minutes or so it would take for all sail boats to pass. The concern of the power boating club is that they can only use the Estuary up to 1½ hours either side of high tide and any delays mean that the usage is further curtailed. The question of moving the power boat course south has been suggested by members of the yacht club, but the problem has been where to place race-monitoring equipment now taken on to the Pleasant Point jetty. New Brighton Power Boat Club members have said that a new jetty would have to be built further south, the cost of which may approach $15,000

The water space which is shared by both these clubs is presently used to such a capacity that the situation is at

times dangerous. Through cooperation the yacht and power boat clubs use the water area in the Pleasant Point vicinity efficiently. The two groups appear to be able to carry out their recreation activities even though relationships between users are frequently strained.

Water skiing is the activity which arouses the greatest conflict among recreationalists using the study area. Of those respondents who experienced conflict, 62 per cent claimed that disturbances were caused by water skiing. Patmore (1972), discussing the compatibility of water based recreation, asserts that power boating and associated activities, such as racing and water skiing, are especially 'unsociable', bringing problems of noise, pollution and wash. The relevance of this comment to the recreational use of the Avon-Heathcote Estuary is illustrated by two case studies which describe the pressures water skiing places on other recreational uses within the study area.

Case Study E

This case study describes the relationship between water skiers and yachting, illustrates the difficulties yachtsmen encounter when leaving from or returning to the Pleasant Point Yacht Club. The respondent (unmarried, male in the 25-44 age category), who described himself as a 'reasonably experienced yachtsman' claimed that the present situation whereby water skiers and yachties use the Estuary is not satisfactory. In his opinion conflicts between and skiing and yachting resulted from the water skiers moving outside the ski lane. The yachtsman claimed that skiers were using buoys marking the power boat course as obstacles to test their turning skills, and on this particular occasion he was forced to sail through the foam which had accumulated at the sewage outlet on the

north-eastern shoreline. When questioned on possible solutions to the conflict, the respondent thought that powered craft should be registered so that those who ski outside the ski-zone could be identified and penalised. The yachtsman believes that water skiing has a place on the Estuary provided the skiers show consideration to other users. At the present time water skiing is undertaken by a number of individuals who have no formal rules or regulations. If skiers could form a group or association then some form of discipline and organisation could be enforced to ensure members comply with regulations set down to allow skiing to co-exist with other recreational uses of the Avon-Heathcote Estuary.

Case Study F

The main purpose of this group's visit was to try out the family rowing boat. On returning from the water the father was questioned as to whether any form of recreation occurring at the Estuary conflicted with his activity. Somewhat annoyed, the respondent complained at what he believed to be the 'deliberate swamping of his dinghy by water skiers'. He claimed that while rowing within 30 metres of the Pleasant Point jetty, water skiers had on two occasions come within 10 metres of his craft. The wake from the power boats caused considerable turbulence and having had limited boating experience the father reported some difficulty in making progress back to the shore. The respondent who had used the study area between 5-12 occasions in the last year said that his experience on day of interview had convinced him that water skiing was not compatible with other passive uses such as sailing and canoeing. He said that he would be reluctant to use the study area for boating unless he could be assured that water skiers would remain in their defined ski-lane. However, the difficulties

involved in policing zoning regulations had convinced the subject that the long term solution lay in excluding water skiers from using the Estuary.

Birdwatching with its special requirements carries seeds of considerable conflict, actual and potential, with most other pursuits. Disturbance at roosting and nesting sites is the most serious problem and is caused particularly by the noise and wake from powered craft. Also of concern is the use of South Brighton Spit by trail bike enthusiasts and dog owners. Many of the birds visiting the Estuary use the spit as a high tide roost, or feed on the adjacent mudflats at low tide. Noises from bikes or unleashed dogs may disturb birds, keeping them circled in the air for up to 20 minutes, leaving them exhausted and thereby jeopardising their chances of making a successful migration. The desire for public access to the foreshore adjacent to the oxidation ponds represents a potential conflict to Ornithologists. A proposed Christchurch City Council walkway between the Estuary and the oxidation ponds has drawn opposition from Ornithologists. The shoreline along the north east corner of the Estuary is an important refuge for numerous birds, especially when the Estuary is rough or disturbances are present at the Spit. The oxidation ponds and their surrounding areas are a wildlife refuge and thus breeding areas would be disturbed if public access is allowed.

Because of the noise and safety problems arising from the use of fast and powerful boats, both power boating and water skiing are unpopular with non-participants and are generally the least compatible of all activities occurring within the study area. Birdwatching activity is currently facing competition from a small group of users. It is

expected that birdwatching will experience greater difficulties as wider use is made of the Estuary for more passive forms of recreation. Other reported conflicts included overcrowding of facilities (7%) and unleashed dogs (3%) roaming freely in domains and picnic areas.

It is evident from the existing conflicts facing various recreation groups at the Estuary, that the perceptual capacities[1] of some users have already been exceeded. Ignorance of capacities clearly presents a problem to the planning for recreation. Failure to recognise the significance of carrying capacities results in deterioration of resource and hence a decline of user satisfaction. The chapter which follows considers the capacity concept within an estuarine environment.

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[1] Perceptual capacity being defined as the maximum level of recreation in terms of numbers and activities that can be accommodated in an area before participants perceive a decline in their attraction to that locality.

CHAPTER 6: RECREATIONAL PLANNING - RESEARCH IMPLICATIONS

The preceding two chapters have examined demand and supply components of recreation at the Avon-Heathcote Estuary. This final chapter considers the intervening element in the demand-supply equation, capacity. A summary of the major aspects of demand and supply precedes discussion of the capacity concept. This is followed by an examination of recreational carrying capacities in the Avon-Heathcote Estuary.

The demand analysis has shown that a large proportion of visitors are attracted to the study area because of its 'natural state', and for 'peace and quiet' in open space. Furthermore, the study has so far revealed significant trends in recreational use patterns, notably a markedly seasonal use of the area and a concentrated weekend use within the summer season. On the supply side, the advantage of the study area for recreation lies in its proximity to the urban population and suitability for a wide range of recreational activities. In terms of public facilities and services the Estuary is not particularly well served. There is a lack of basic facilities such as public slipways, toilets, fresh running water and cooking facilities. The area's main attractions are its natural resources including the water body and the variety of flora and fauna which inhabit the Estuary and its shores. Estuarine ecosystems are extremely sensitive natural systems and consequently much of the recreational pressure within the study area is concentrated on a resource base which is fragile and susceptible to injury from recreation.

The most important consideration to have emerged from the present survey stems from the fact that some of the growth in water related recreation activities must be

accommodated within a natural resource whose capacity to sustain such activity is limited. All available evidence, such as the growing membership of several of the sports clubs located on the Estuary (see Table 6), points to a rapid intensification of recreational use of the Avon-Heathcote Estuary.

Table 6: Recent membership figures of sporting organisations located at the Estuary

	1973/74	1976/77	1978/79
Pleasant Point Yacht Club	97	107	160
Mt. Pleasant Yacht Club	330	321	380
Christchurch Yacht Club	200	232	258
New Brighton Power Boat Club	198		232

6.1 CLASSIFICATION OF RECREATION AREAS

Using Clawson and Held's (1968) terminology, recreation areas are identified as user oriented, resource based and intermediate type of resources (Figure 12). This classification recognises that recreation may consist of varying mixtures of environmental and social content. The three divisions are classified as follows:

i) Resource based classification contains a very high environmental factor.

ii) Intermediate resource classification contains both natural environment and social factors in varying proportions with neither factor being excluded.

iii) User oriented classification has a very high social factor with a minimal natural environmental factor.

User oriented areas are at one extreme of the classification and are of special concern in studies of urban recreational facilities as they include most city facilities, from

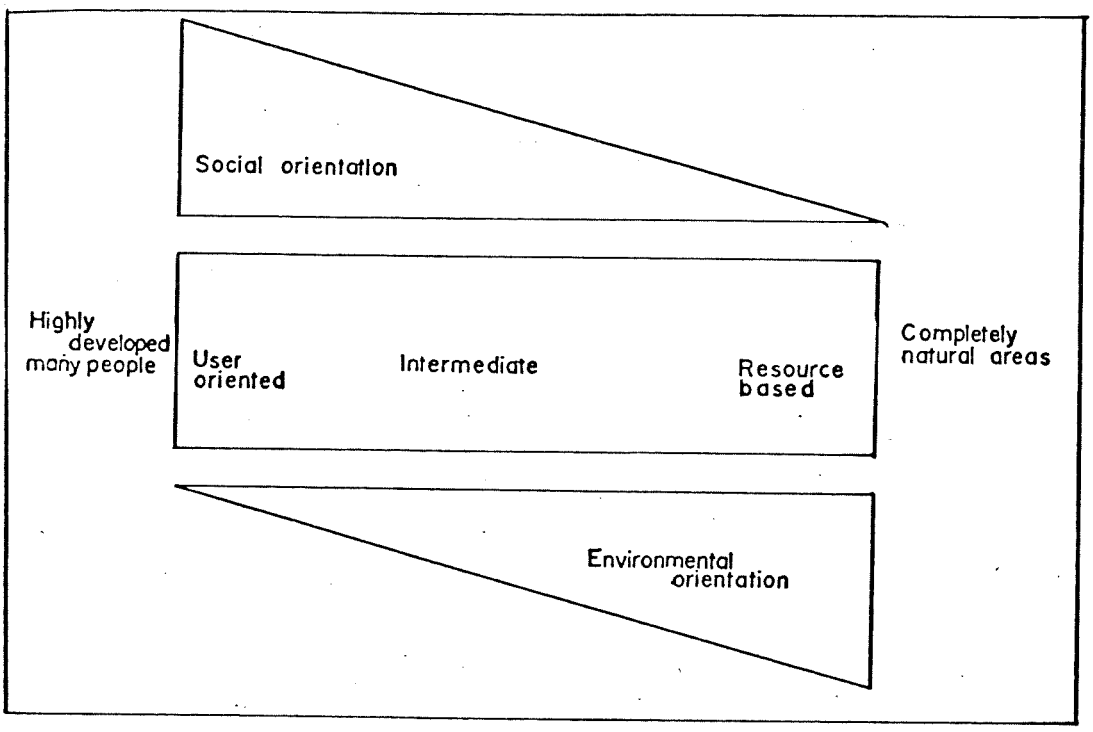

Figure 12: The basis of Clawson and Held's classification of recreational activities and resources

parks to children's playgrounds. Ease of access and high levels of usage are characteristic of these user-oriented recreation areas and inevitably they account for a large part of the demand for recreation facilities. Such areas are individually small and are not too demanding in terms of quality of the environment in which they are located.

Resource based areas are at the other extreme. Their dominant characteristic is their outstanding physical quality such as mountains and forests and they are usually considerable distances from concentrations of population. Resource based areas are generally very large units, sometimes occupying several thousand hectares. In New Zealand the best examples of resource based recreation areas are our National Parks.

Intermediate areas lie between these extremes, both geographically and in terms of use. They must be well located to users and preferably be sited within an hour's driving time of the user's home. Such areas are typically used for day outings and at weekends. Visits to them normally involve less travel time and expense than visits to resource based areas and within the restriction of distance they should be the best sites available. (Seeley, 1973).

Not all facilities fall neatly into these groupings, therefore, in practice, there is a continium from one extreme of Clawson's categorisation to the other. Nevertheless, in fitting the study area into the above classification, it is argued that the Estuary, by virtue of its natural appearance and its proximity to a large urban centre, is best described as an intermediate recreation resource area.

Oriordan (1967) maintains that the demand for recreation facilities increases at a rate five times greater than the increase in population growth. Clawson (1959) similarly notes the exponential increase in recreation demand. In his article Crisis in Outdoor Recreation (1959), he forecasts that there will be a tenfold increase in participation in outdoor recreation in the United States between 1950 to the year 2000, but that this increase will be distributed unequally between the three different recreation resources. He predicts the following increases in visitation:

User oriented	-	four fold increase
Intermediate	-	sixteen fold increase
Resource based	-	forty fold increase.

If Clawson is correct in his forecast, and the United States situation can be extrapolated to New Zealand, by the year 2000 we can expect a four fold increase in the number of

visitors to inner city parks, a sixteen fold increase in the usage of the Avon-Heathcote Estuary, Stewarts Gully, The Groynes and a forty fold increase in the numbers visiting distant resource based areas such as our National Parks and skifields. However, in light of the changed energy situation there may be different patterns - less in distant places and more close to cities - than those predicted by Clawson. Furthermore, although Clawson predicts by far the greatest increase in people going to resource based areas, the numbers visiting such regions are at present still only small and will remain relatively small (Clawson, 1959). The real problems are going to come in those already fairly heavily used areas which lie in close proximity to our large urban areas. These trends should have definite influences on recreational planning, for while the population grows and the trends above are accentuated, the pressures on semi-natural areas from recreationalists increase greatly.

The Avon-Heathcote Estuary represents an area which can be expected to experience greater user-pressure from recreation. Table 7 displays counts of people on typical recreation days over the summer of 1979. It is apparent that the present number using the study area is comparatively small. However, it only needs a small increase in visitation to create a potential threat to the estuarine environs and user satisfaction. In the light of the "exponential" increases foreseen by Oriordan (1967) and Clawson and Knetsch (1966), the adequacy of this finite area seems doubtful. It is, therefore, crucial that measures be taken to ensure that future use of the Estuary by recreationalists (and other users) be controlled, if severe degradation of the environment is to be avoided.

Table 7: Observation counts of recreationalists using the study area

SITE	Waitangi Day Public Holiday	Saturday 20th Jan.	Sunday 18th Feb.	Weekday
1. Pleasant Point Yacht Club	28(22)	12(10)	18(12)	8(10)
2. Humphreys Drive	4	-	2	-
3. Mt.Pleasant Yacht Club	58(54)	34(16)	52(26)	12(7)
4. Celia St.Slipway	36(8)	8(2)	45(16)	16
5. Causeway	38(16)	18(6)	9(34)	11(3)
6. McCormacks Bay	12	6	3	8
7. Christchurch Yacht Club	18(20)	12(5)	24(12)	3(4)
8. Near Shag Rock	5	2	11	
9. Fishermans Wall	17(8)	7(3)	15(9)	2
10.Pleasant Point	94(11)	13	56(3)	12(2)
11.South Brighton Spit	4	-	2	-
TOTALS	304(139)	112(42)	238(112)	72(26)

(Figures in brackets are watercraft)

The need for restraints on recreational use is illustrated in the following statement:

> No matter how well an outdoor recreation area is planned and managed, and no matter how well people behave, there is nonetheless some limit beyond which recreation use of a given area cannot be increased without direct loss of quality and once loss of quality begins, further deterioration often follows swiftly and severely. It seems almost inescapable that popular areas must have use ceiling established and enforced.
>
> (Clawson and Knetcsh, 1966 pg. 176)

6.2 CONSIDERATION OF THE APPLICATION OF CARRYING CAPACITY FOR OUTDOOR RECREATION IN THE STUDY AREA

Over the last 10-15 years there has been a wealth of literature written around the broad and vague concept of "carrying capacities". With increasing population and

amounts of leisure time, the frequency with which outdoor areas are being used is accelerating and consequently resources are beginning to experience sustained pressure from recreation. The rapidity with which sites deteriorate under pressure has prompted research on the environmental effects of outdoor recreation Alden (1974), the Lindsay County Council (1970), Liddle (1973) and Wall (1977). Implicit in research on the impact of recreation is an ecological perspective concerned with man's cooperation, interaction with, and understanding of the biophysical environment (Liddle, 1973). Man is viewed as an integral component of a recreation system in which his activities are seen to affect the environment which in turn influences his own actions and perceptions. The interrelatedness and interdependence of the natural environment suggest that evaluation of carrying capacities to be meaningful must consider the impact of recreation on all aspects of the environment and on man himself.

As Tivy (1972) states, "the carrying capacity of land and water for recreational uses has emerged as an important area of research.....". This stems largely from increasing demands of urban populations for open space, preferably in the natural or semi-natural condition. The areas in Christchurch in this condition are gradually diminishing. The Avon-Heathcote Estuary is only now being recognised in terms of its real value for recreation. There are three reasons that may be cited as causative factors underlying this change of attitude,

a) the diminishing supply factor of recreation areas
b) the problems of overcrowding in other recreation sites
c) the increasingly prohibitive cost of present and future recreational travel.

It would seem that numbers using the area may be expected to increase substantially and there is a real need to relate the management of recreational use of the Avon-Heathcote Estuary to the notion of carrying capacity. However, before discussing the application of the capacity concept to present study it is necessary first to define the meaning of carrying capacity.

6.3 RECREATIONAL CARRYING CAPACITIES

Much of the uncertainty and vagueness which surrounds the use of the term 'capacity' in the context of recreation is summarised in Barkham's (1973, 218) comment:

> "Carrying capacity is a phrase delightful in its simplicity, complex in its meaning and difficult to define, as in different situations and to different people it is understood in different ways. Moreover, at least in the recreational field, carrying capacity is difficult to quantify, has been quantified in very few instances and is therefore, a tool which has been little used in recreational planning situations!"

The notion of carrying capacity has been applied to recreation despite some question of its appropriateness and applicability (Wagar, 1964). The concept of recreational carrying capacity has been succinctly defined in the Countryside Recreation Glossary as "the level of recreation which an area can sustain without an unacceptable degree of deterioration in either the character and quality of the resource or the experience" (Gittins 1971, 135). However, it is difficult to set limits as to what level of damage constitutes an "unacceptable degree of deterioration" and hence this must depend upon the perception of the individual. Furthermore, as is shown by Wall (1977), the degree of deterioration is not a simple calculation but depends upon the interrelationships of site characteristics and the type, duration and intensity

of recreational use. Since the vulnerability of the different components of the environment to recreational impact varies, and can be manipulated by management, there can be no absolute value for recreational carrying capacity. There is no fixed figure we can point to for a particular recreation area and say "this is the carrying capacity". Management and planning of recreation is a complex task and must not only consider a wide range of activities, many of which are in conflict with one another, but must also provide opportunities for a) many different kinds of users; old, young, active and passive and b) a wide range of values, many of which are incompatible with one another.

Three different forms of carrying capacity may be broadly distinguished:

a) Physical capacity: is the easiest concept to grasp because for many recreation activities a site imposes physical limits. However, in some cases physical limits are imposed not by the site but by ancillary facilities such as car parks, shops, cafes etc. Physical capacity is most applicable in estimating the numbers which can be accommodated in sports stadiums. In recreation sites used for informal recreation the physical capacity of the landscape is irrelevant as the b) c) capacities are likely to be exceeded before the physical limit is approached.

b) Perceptual or psychological capacity: is the maximum level of recreation use in terms of numbers and activities that can be accommodated in an area before participants perceive a decline in the quality of the recreation experience. For recreationalists

seeking a solitude experience, the recreational capacity in this case will be equivalent to the individual's perceptual capacity. This is the most abstract and least tangible of the capacity concepts. Yet it is arguably the most important in the sense that it determines the satisfaction gained from a recreational experience

c) Ecological capacity: is concerned with the maximum level of recreation use that an area can accommodate before ecological damage or decline occurs. The changes that take place are influenced by geology, relief, soils and vegetation cover of an area as well as nature and seasonal intensity of use.

The idea of capacity springs essentially from the notion of quality since it is implied that when capacity is exceeded quality is reduced. But quality of the environment, and therefore of the recreational experience, is an elusive item because there is no single unequivocally defined quality. Quality depends upon perception, and perception is the way in which people view their surroundings. It is not only variable between people and through society, but also continuously variable in individuals (and therefore in society) through time (Barkham, 1973).

Despite the difficulty in applying carrying capacity to recreation, the term can be useful for development guidelines. A range of potential capacities can be identified which will each produce different environmental consequences (Wagar, 1974 - cited in Wall, 1977, 44). Ecosystems with a low range of tolerance for human interference can be identified (e.g. fragile vegetation, coastal dunes, wildlife breeding

areas); conversely very tolerant ecosystems can be identified. With a knowledge of environmental impact at different use intensities, it would be possible to establish management controls and maintenance policies to prevent overuse. Changes in the environment are inevitable but the concept of carrying capacity can help to manipulate the degree and direction of change. What is considered an "acceptable" degree of deterioration will reflect management objectives.

6.4 APPLICATION OF CAPACITY CONCEPT TO THE ESTUARY

A basic premise of this research is to reconcile recreation with conservation of the Avon-Heathcote Estuary. The framework outlined in Chapter Two emphasised the need to give equal consideration to both user and resource aspects of the recreation equation. In this regard the notion of capacity has relevance to the present research as the three basic components of carrying capacity: a) management objectives b) visitor attitudes c) recreational impact on the physical resource (Lime and Stankey, 1971) embody both population and supply elements of recreation. Although much work remains to be done in translating the whole concept of capacities into a usable form, the idea has important implications for future recreation planning because "Unless the trend toward heavier and heavier use of some areas can be modified, and even in some cases the present degree of interests reduced, then many present recreation areas will suffer severe physical deterioration" (Clawson and Knetsch, 1966 p. 176).

The management objectives set for a recreation area are the controlling factor in determining carrying capacity. These objectives must define the type of recreational opportunities the area is going to provide. For example, will the

goal of the area be to provide recreation in a near natural setting with a low level of development or will the emphasis be on high density use with well developed facilities to provide for as many visitors as possible? In setting management objectives the physical resources of the area and the attitudes of users must be considered. Both of these variables are affected by increasing numbers of recreationalists and may together or by themselves establish constraints on the amount of use the area may sustain.

At the present time the Christchurch City Council is involved in preparation of a Maritime Plan for the Estuary, but until such a plan is completed goals for management will not be clear. In the absence of management goals the discussion on recreational carrying capacities for the Avon-Heathcote Estuary is based on the assumption that future management will aim to achieve the best possible combination of uses to serve the needs of society while protecting, preserving and enhancing the biophysical environment for the continuing benefit of present and future generations.

The discussion on recreational capacities of the Avon-Heathcote Estuary focusses on ecological and perceptual capacities since it is anticipated that either one or both of these would be exceeded before physical capacity is approached. Nevertheless, consideration of physical capacities has some relevance in the sense that finite land and water resources within the study area impose restrictions on use.

Over the entire study area the present numbers using the Estuary are below the maximum number the area could support. However, on three occasions during the study period information obtained from visitors indicated that the numbers using the Celia Street and Pleasant Point recreation sites

were approaching the perceived capacities. At these locations both the physical capacity and the opportunities for visitor enjoyment could be increased through the employment of measures such as providing additional slipways or some reclamation of wetlands to establish picnic sites. However, such measures would be undesirable from at least two points of view. Firstly, results of the demand survey showed that a significant proportion of users (27%) selected the Estuary as a venue for recreation because of its 'naturalness'. Secondly, from the recreational point of view it is important that the individual is provided with a range of environments in which to carry out his leisure activities. The Avon-Heathcote Estuary provides a diversity of recreational opportunity within the Christchurch region and it is important that the character of the Estuary be retained.

Ecological capacity

It is clear that areas of potential wildlife interest, by virtue of their amenity, will often be attractive to recreation seekers, possibly more so in coastal areas than elsewhere. The problem is that many forms and degrees of recreational usage may be detrimental to the resource, because of the physical strain on the environment and general disturbance or misuse. There may also be certain segments of recreational use which are entirely compatible with the maintenance of wildlife values and which might be encouraged to a certain extent. In matching potential use to land and water resources, particular regard must be paid to existing site quality (and scarcity), its vulnerability and capacity to sustain use without deterioration and its suitability for multiple use.

Barkham (1973) claims that recreation capacity in general may presumably be calculated in terms of physical capacity of the facilities and perceptual capacities with only a few isolated cases where ecological capacity becomes significant. The Avon-Heathcote Estuary is an example of an area in which ecological capacities are important in determining recreational capacities. The estuarine ecosystem is an extremely fragile natural system and is the most biologically productive in the biosphere.

> "These high rates of estuarine productivity clearly are the biological bases for the abundant life of the coastal zone and one in which man does and will increasingly depend on heavily"
> (Cooper, 1971, 130)

The implications of this, together with the major role that estuaries play in the life cycles of marine birds, edible fish and as wildlife habitats for crabs, cockles and other animals, accentuates the critical need for correct management of these areas. In terms of management, the primary functions of estuaries should be given priority while secondary uses, such as recreation, should be restricted to levels which are compatible with these natural functions.

Semi-natural areas are limited in extent and often sensitive to the effects of recreation. On sites where recreation management is practised the policies adopted usually focus too much on managing the visitor and are insufficiently concerned with monitoring changes in the resource (Goldsmith and Munton, 1971). In many cases it is the properties of the ecosystem that effectively determine the capacity of an area to absorb recreational pressure. Consequently, many forms of recreational management have been concerned with increasing the durability of the physical resource.[1]

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[1] Wagar's (1964) account provides a discussion of some of the methods employed in 'hardening' the physical resource.

Many of these techniques, such as conversion of natural vegetation cover to more hardy species, require alteration of natural environments. A more desirable means of improving the ecological/recreational capacity of the Avon-Heathcote Estuary is through increasing contact with the public (both visitors and potential visitors). For the Estuary it is suggested that communication between local authorities and recreationalists could be improved by greater dissemination of information through local authorities, clubs and organisations currently using the area, newspaper and radio. Public lectures, illustrated talks and nature walks held within the study area could also increase communication between users and public agencies. The walkway extending from the South Brighton Spit could be made more attractive if selfguided trails and brochures providing information such as life histories and migration routes of the various bird species which inhabit the Estuary were available.

Increasing contact with visitors can help them to find out what the range of recreational opportunities and attractions is in a given area. Recreational experiences may also be enhanced if visitors can be taught an understanding of the basic concepts of ecology and other outdoor values. This in turn should increase their awareness of some of the more subtle attributes of the study area (geology, wildlife and ecology). By deepening their sense of appreciation and awareness for the natural environment more recreationalists could take better advantage of an area's recreational potential (Lime and Stankey, 1971). Finally, it is hoped that increasing the flow of educational information to the public will result in a reduction in the destructive behaviour of some persons. We assume here that much of their destructive behaviour is simply the result of not knowing what is right, rather than

maliciousness.

Perceptual capacity

The perceptual or psychological factors limiting carrying capacity are those dependent on what have been called "the attitudes" or "social behaviour" of the recreationalists (Chubb and Ashton, 1969). The notion of perceptual capacity differs according to the mood of the individual, the nature of the activity and where and when the activity takes place. Consequently the application of this concept to recreation research has been limited (Wagar, 1964) because of the problems of gauging capacities when these differ both within and among individuals for the reasons considered above. However, despite these difficulties it is essential that perceptual capacities be given consideration in discussing recreational carrying capacity because of all capacities, perceptual capacity is the most important in determining the quality of an individual's recreational experience (Barkham, 1973).

The discussion of compatibility of various forms of recreation within the study area (see section 5.4.3) has shown that even at the present usage, serious conflicts exist among recreation users. Concentration of recreation demand within the summer period and especially on weekends inevitably results in strained relations between incompatible uses, such as water skiing and passive forms of recreation, which are required to share limited land and water resources. Given the continuation of 'time peaking' of demand (Patmore, 1972) and an expected growth in use of the study area, it is likely that increasing conflict between recreationalists will make the Estuary less attractive as a venue for recreation. Faced with the prospects of providing a wide range of activities for an increasing number of users it is expected that a larger

number of people will perceive the area as 'overcrowded' and therefore experience a decline in the satisfaction of their recreational experience.

Attempts to increase perceptual capacities can be achieved by modifying various aspects of visitor behaviour[2] - especially use patterns. Within the Estuary, zoning is currently employed to prevent water skiing and power boating interfering with other activities. However, the failure of water skiers to comply with zoning regulations has aroused support for the removal of water skiing from the Estuary. The question of water skiing within the Estuary will need to be looked at closely in the near future. If skiers continue to ignore the zoning regulations then some of the following courses of action may have to be considered to ensure that water skiing does not unduly detract from other recreational uses within the study area. Possible alternatives include:

1) the registration and identification of all powered craft using the Estuary
2) policing and enforcement of zoning regulations in order to identify and penalise those who do not comply with regulations
3) encourage water skiers to combine to form an organisation which could organise and coordinate water skiing within the Estuary
4) the exclusion of water skiing from the Estuary

It will be interesting to see what effect the rise in fuel prices has on the recreational use of the Estuary by power boats. The rising costs of recreational travel could mean that the Estuary could become a more popular venue for power boating and associated activities. If this is the case than it is almost certain that one or a combination of alternatives outlined above will be introduced in the near future.

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[2] See Wagar, 1964

On the other hand, the high cost of fuelling boats could result in power boating and water skiing being available to a smaller percentage of the total population. In this case the conflict between power boaters and other users could resolve itself as the numbers participating in this form of recreation could decrease considerably.

6.5 PROPOSING A REGIONAL RECREATION PLANNING STRATEGY

The concept of recreational carrying capacity for the Avon-Heathcote Estuary has been discussed and in this final section a planning strategy for the Canterbury Region[3] which could assist the maintenance of capacities within the study area is examined.

Conflicts of interest and competition arising from the demands for space on the one hand and the demand for facilities on the other are already evident within the Estuary. Intensification and spread of this conflict into outlying parts of the Region's coastline is inevitable unless some decisive far-sighted management policies are put into effect. The increasing complexity of demands strongly suggests that in future the responsibility for anticipating recreation demand and providing for it must lie with regional rather than local planning authorities. In this role, regional planning must initiate and establish conservation priorities as well as guiding and assisting local authorities. This can only be achieved within the framework of a regional strategy which would aim at balancing recreational development needs and preservation of recreation areas.

It is emphasised that in order to retain both the quality of recreational experience and the physical resources

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[3] The Canterbury Region being defined as the area bounded to the north by the Ashley River, to the south by the Rakaia River, to the east by the coast and to the west by the Main Divide.

of the Avon-Heathcote Estuary, or any other recreation area for that matter, recreational activity cannot be considered in isolation in terms of its relationship with rural or urban recreation sites. When recreation is viewed in this way it follows that the coast cannot be treated as something separate from other inland sites, for they are all part of an integrated recreation system. Many inland sites, such as national and urban parks, lakes, reservoirs and rivers offer opportunities that can readily act as substitutes for the coastal environment (Mercer, 1972). In short, in order to spread recreational pressures more equitably in both time and space it is becoming increasingly necessary to view all of the recreation resources of a city region as a whole.

Those essential elements of a region-wide strategy for preservation and development of recreation resource have already been identified in Travis et al(1970). The application of a region-wide systems approach to recreation planning does, however, presuppose a knowledge of resource qualities which contribute to recreation and conservation values. This involves:

1) an identification of the various landscape and recreation resources within the region.
2) establishment of their characteristics and qualities for particular uses and activities within a broad regional context of resource supply and demand.
3) a classification of outdoor recreation resources into a series of areas with different levels of ecological stability.

The argument so far has been leading up to the concept of zoned use, according appropriate activity to a graded hierarchy of environmental qualities. While fragile environ-

ments are unfortunately often easy to modify or destroy, they are usually impossible to recreate, with their structured animal and plant populations. On the other hand, severely modified environments elsewhere can frequently be improved, landscaped and provided with those recreation facilities which satisfy the demands of very large numbers of visitors. There is therefore a very strong presumption in favour of concentrating intensive recreational use in areas which can be improved and managed specifically for this purpose rather than allowing surviving areas of high amenity value to be degraded by inappropriate levels and type of recreational activity.

One of the important consequences of adopting a regional recreation planning strategy is that it conserves a range of environments of different 'quality' and hence a choice of alternative levels of recreation. Increasingly, with depletion of existing land resources, the increase and intensity of use of popular areas, and possibly an increase in demand for specialist and more sophisticated forms of recreation, a diversity of sites will be required, and a premium placed on those areas which have retained their natural characteristics. Such activities as bird watching, nature photography etc. are valid recreational uses apparently on the increase. Unfortunately, suitable sites for such activity are decreasing. There is a very strong case for retaining wherever possible semi-natural areas, like the Avon-Heathcote Estuary, not confined to the remoter regions of the country, but within reasonable access to major population centres.

APPENDICES

APPENDIX 1

Table 1: Summary of results of major regional surveys of outdoor recration in New Zealand

LOCATION	AUTHOR	DATE	COMMENTS	RESULTS Most popular activitie
Dunedin	Dunedin City Council	1969	Concerned with location and distribution of facilities and use made of those Results provide only very general information because of restricted survey period	-
Palmerston North	Palmerston North City Council	1969	Many methodological deficiencies; results must be treated as tentative	1) Driving 2) Music 3) Swimming & Surfing
Hamilton	Hamilton City Council	1971	Useful indication of general activity patterns within region	1) Driving for pleasure 2) Visiting the beach 3) Picnicking 4) Visiting Parks & Gardens
Auckland	Auckland Regional Authority	1971	Only active outdoor recreation pursuits considered. Included organised or informal water based activities	1) Swimming 2) Fishing
Christchurch	Neighbour	1973	Considered frequency of participation in urban and rural land based recreation	1) Pleasure driving 2) Picnicking 3) Visits to the beach 4) Organised sport
Auckland	Auckland Regional Authority	1973	Identifies resources & strategies for water based recreation in Waitemata Harbour	
Hamilton	Hamilton City Council	1973	Lengthy self administered survey covering broad range of activities. Low response rate so results considered accordingly.	1) Swimming 2) Fishing

LOCATION	AUTHOR	DATE	COMMENTS	RESULTS Most popular activities
Wellington	Henderson & Stagpole	1974	Concerned mostly with casual unorganised recreation	1) Visits to the beach. 2) Swimming 3) Pleasure driving 4) Trips and picnics to the bush
New Zealand	Robbard Howarth	1976	Preliminary results only	1) Gardening 2) Reading 3) Sewing 4) Rugby 5) Swimming
Marlborough	Lands & Survey	1977	Identified resources available for outdoor recreation and regional demand patterns	1) Pleasure driving 2) Visiting beach/river/lake 3) Picnicking

APPENDIX 2

UNIVERSITY OF CANTERBURY DEPARTMENT OF GEOGRAPHY

Questionnaire on the Recreational Demand for the Avon-Heathcote Estuary

Interview No._____ Time_____

Location_____ Date/Day_____

Weather_____

(1) Which recreational activity best illustrates the main reason for you coming to the Estuary today?

_____

_____

(2) Do you intend to take part in any other form of recreation while visiting here today?

YES
NO

If your answer is 'yes' please specify those other activities you intend to pursue.

_____

_____

(3) How many days have you taken part in the above activity in the last 12 months?

1-4 days 5-14 days 15-21 days over 21 days

(4) When do you normally carry out the above activity?

Sat Sun Weekday
After work/school Anytime (no set pattern)
During holidays Other (please state_____

_____

(5) What time of year would you usually visit the Estuary?

Summer Winter All year round

(6) Did you plan to come here today or were you just passing?

Planned
Just passing

(7) What mode of transport was used to travel to the Estuary?

_____

(8) Who did you come here with today?

Alone ☐ With family ☐ With friends ☐

With organised group ☐

(9) What is the size of the group you came with?

_____

(10) Do you have any children with you here today?

No children ☐ Pre-school ☐

School children ☐ Working children ☐

(11) Is the car a necessary part of your recreational activities at the Estuary?

YES ☐

NO ☐

(12) Do any of the other recreational activities which occur at the Estuary lessen the enjoyment you obtain from pursuing your own form of recreation?

YES ☐

NO ☐

(13) If your answer is 'yes' please provide details of the undesirable effects or conflicts caused by these activities

_____

_____

_____

(14) What suggestions would you make as to how these conflicts could be reduced _____

_____

_____

_____

(15) Will you be visiting the Estuary again in the near future? YES ☐

NO ☐

(16) Your name is not necessary but could you mark on the map of Christchurch the approximate location of your house.

(17) Male ☐ Female ☐ Marital Status

(18) Which age category are you in? 1 2 3 4

Are you satisfied with the recreational facilities at the Estuary or are there some changes you would like to see made?

Satisfied ☐

Changes desired ☐

If you think improvements could be made in the facilities for the activities you do please say what improvements you would like to see and where

Are you satisfied with the recreation environment at the Estuary?

Why do you carry out this form of recreation at the Estuary as opposed to Lake Ellesmere/Waimak. and Brooklyn lagoons/Banks Peninsula/The Groynes/Lyttelton Harbour?

Have you any other comments about recreation at the Estuary?

APPENDIX 3

Plates showing results from photographic observation

Plate 1X

Plate X

APPENDIX 4

Checklist of fish recorded from the Avon-Heathcote Estuary[A)]

In the following list the abundance of each species is recorded in three categories: + = rare ++ = frequent +++ = common

rock fish	+	pipefish	+
yellow eyed mullet	+++	red gurnard	+
short finned eel	+	smelt	+
long finned eel	+	dingfish	+
kahawai	++	cockabully	+++
thornfish	+	barracouta	+
elephant fish	+	pufferfish	+
whitebait	+		
spotted stargazer	+		
common bully	+		
giant bully	+		
red-finned bully	++		
sea horse	+		
moki	+		
rigg	+		
common sole	+		
red cod	++		
guffy or spotty	++		
garfish	+		
yellow bellied flounder	+++		
black flounder	+		
sand flounder	+++		
sea(brown)trout	+		

A) After Knox and Kilner (1973)

APPENDIX 5

Specific Areas Recommended for Reserves

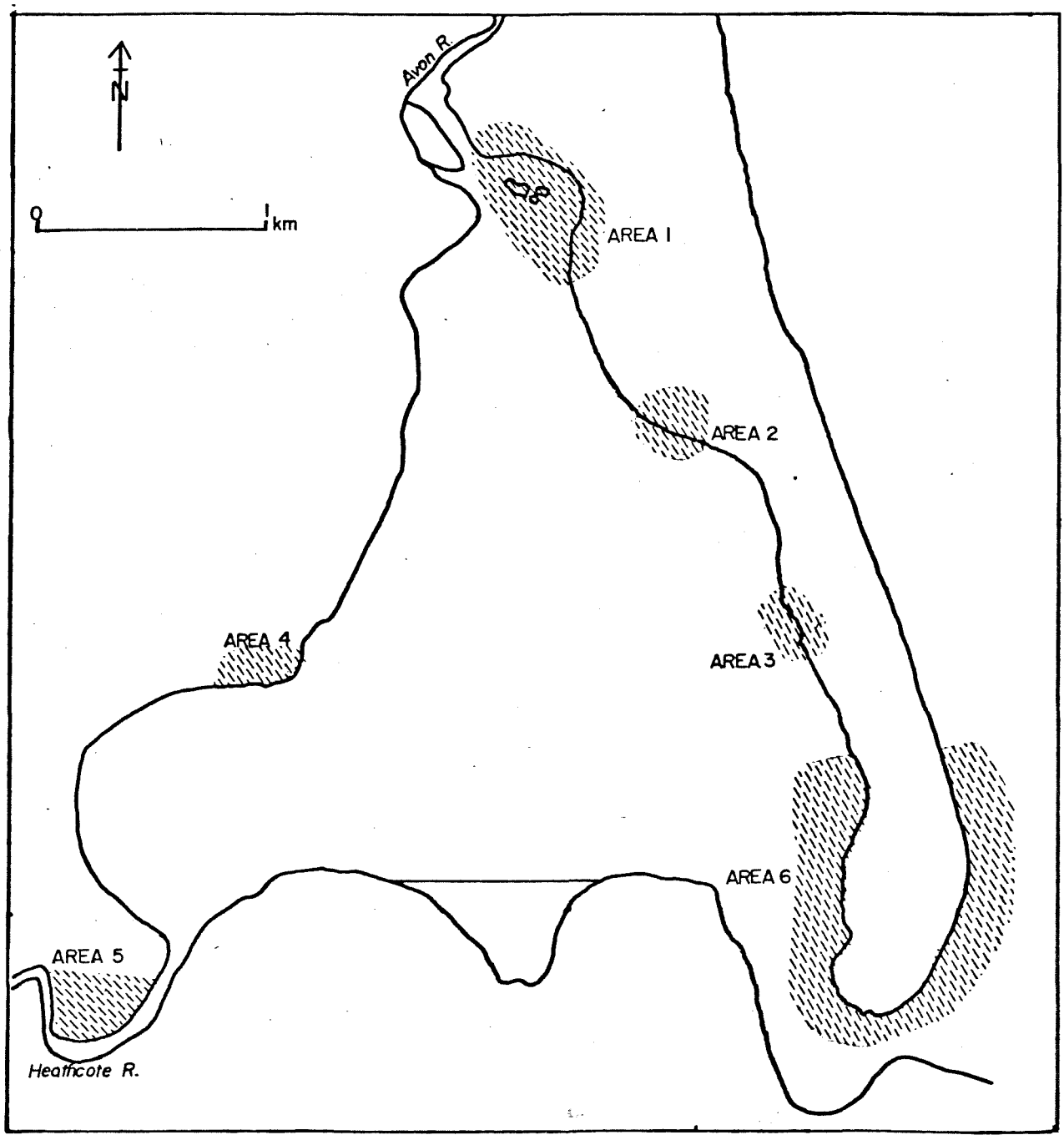
Area 1 This area, being influenced by the tides and various salinities of water and not having been polluted by industry, is the most important from several points of view. It contains one of the two largest areas of Leptocarpus salt marsh remaining in Canterbury. The lower reaches are dominated by mosaics of sea rush, jointed rush, salt-marsh ribbonwood, three-square club sedge, tall club sedge and cord grass (Knox and Kilner, 1973). Further upstream these plants gradually grade into species associated more with fresh water and that have practically disappeared from the Heathcote River. As well as being a breeding area for ducks, this area is a habitat for two seldom seen native birds, the marsh crake and the bittern. The area is also a very valuable university research area.

Area 2 Although there has been some disturbance of the area in the construction of a stopbank and drainage channels, it contains more extensive areas of short turf salt-marsh than occur elsewhere around the Estuary. The predominant vegetation consists of salt-marsh ribbonwood and sea rush, but many other small species are present, including salt grass, glasswort, native primrose and slender celery.

Whilst wildlife values have been limited by the stopbank that blocks off the normal action of the tides, this area is still worth preserving for its botanical value and visual amenity.

Area 3 This small area warrants preservation because of the interesting phenomenon of colonisation of the Estuary mud by sea rush and the presence of much seablite as well as many other salt-marsh plant species (Calder, 197). The vegetation

Figure 13: Proposed Wetland Reserves for Avon-Heathcote Estuary



is also useful for stabilising the shoreline.

Area 4 This area has large patches of sea rush and jointed rush. It is favoured by several bird species including pukeko, ducks and quail. It has the only native vegetation of any extent along the west side of the Estuary and will be invaluable for pukeko breeding if the Drainage Board area ever becomes unsatisfactory. The proposed reserve area contains a small but attractive shell covered beach. Unfortunately, some salt-marsh vegetation adjacent to the reserve has been lost because of roading or fencing operations, but the remaining area is still worthy of protection.

Area 5 This area is not as diverse floristically as the areas on the Avon but is nevertheless a very important area from the wildlife viewpoint, particularly for ducks, herons and pied stilts. With the incoming tides, fish, especially the yellow-eyed mullet which feed on algue and detrital debris, move on to feed on the mud and the epiphytic algue on the dominant plant species, Juncus maritmus. As the whitebait becomes more numerous in the Heathcote with recovery from pollution it could become an important breeding ground for this species.

Area 6 The end of the Spit is of extreme importance to wading birds. It serves as a high tide roost for up to 7,000 godwits 4,000 oyster catchers (Knox and Kilner, 1973). These birds are subject to increasing human and canine disturbances over the high tide period and it is desirable that some resources which protect the various bird species be introduced.

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