P O Box 33 849 Takapuna, Auckland
Level 2 Takapuna Business Park
4 Fred Thomas Drive, Takapuna
ph. 09 486 8068 mob: 021 646 181
fax: 09 486 8072 email: sbrown@kma.co.nz

STEPHEN BROWN
ENVIRONMENTS LTD

WHANGAREI DISTRICT LANDSCAPE ASSESSMENT REVIEW 2005

April 2005

1. Introduction

This study has been prepared on behalf of the Whangarei District Council. In 1994-5 LA4 undertook a criteria based assessment of the District's perceived landscapes, employing criteria drawn from overseas (essentially United States') research into the psychology of environmental perception. Subsequently, Council implemented some, though not all, of that study's findings through the identification of Outstanding and Notable Landscapes in the District Plan and related maps.

However, the Environmental Defence Society's subsequent review of landscape planning procedures and management policies in "*A Place To Stand*" (2003, Raewyn Peart) highlighted areas of concern in relation to the identification of outstanding and other valued landscapes - substantially related to the approach and criteria employed in the 1994-5 assessment; the need to address 'cultural / heritage landscapes' in response to a new section 6(f) of the Resource Management Act; and the need for greater accuracy in the translation from study findings into district plan strategies and provisions.

In particular, the Environment court has provide guidance, through the likes of the *Pigeon Bay Aquaculture Limited v Canterbury Regional Council* case about its expectations in terms of landscape inventories and evaluations. Specifically, Judge Jackson identified the following factors that should be addressed in determining relevant landscape objectives, policies and rules:

a) natural science factors -the geological, topographical, ecological and dynamic components of the landscape;

(b) its aesthetic values including memorability and naturalness;

(c) its expressiveness (legibility): how obviously the landscape demonstrates the formative processes leading to it;

(d) transient values: occasional presence of wildlife; or its values at certain times of the day or of the year;

(e) whether the values are shared and recognised;

(f) its value to tangata whenua;

(g) its historical associations.

Consequently, this review has been undertaken to address current 'gaps' in the landscape knowledge base for Whangarei District and to provide a foundation for a range of landscape management measures designed to address those short-comings.

It is important to appreciate, however, that this is not a full re-assessment of the District landscape. Instead, the review pulls together existing information about the ecological and heritage values of different parts of Whangarei District and utilises recent research into New Zealanders' perception of our national landscapes and related values to 'check' the 1994-5 identification of Outstanding and Visual Amenity Landscapes in terms of 'aesthetic values' and 'expressiveness' [and sections 6(b) and 7(c) of the Resource Management Act]. At the same time - recognising that many coastal areas, in particular, have been subject to considerable development pressure since 1995 - the boundaries for the landscape units identified in 1995 have been reviewed.

Finally, this exercise has also provided the opportunity to address the related, but discrete, issue of the Natural Character of the Coastal Environment [section 6(a) of the RMA] using criteria now generally agreed as being appropriate for such assessment.

Consequently the key outcomes of this assessment are:

- Re-definition of the 1995 landscape units and their boundaries
- Identification of the District's (perceived) Outstanding and Visual Amenity Landscapes
- Identification of its key heritage landscapes
- Identification of its valuable ecological / habitat resources
- Identification of the District's coastal environments that exhibit high Natural Character Values.

2. What Is Landscape?

In the case of **J A Campbell & Others V Southland District Council**, the Environment Court repeatedly commented on the difficulty of addressing 'landscape' without a clear description or understanding of its meaning and terms of reference about the way in which it is to be addressed under the Resource Management Act. Nevertheless, Judge Kenderdine's decision makes the interaction of 'landscape' as both physical and perceived entities clear, and acknowledges the interplay between landscape and amenity values [Sections 6 and 7]. The role of aesthetic values was also mentioned and quoted [taken in turn from the Canterbury Regional Landscape Study]:

> *"….. pertaining to quality of human perceptual experience (including sight, sound, smell, touch, taste and movement) evoked by phenomena or elements or configurations of elements in the environment." (p.30)*

In the **Wakatipu Environmental Society Inc v Queenstown Lakes District Council** the Court discussed and considered the definitions of landscape, amenity values and environment at some length. It adopted a positive approach to the definition of landscape, based on its own research, and concluded that:

- An important aspect of these definitions is their comprehensiveness and the interaction between landscape values with other values such as natural character, indigenous vegetation, amenity, etc.
- Landscape can be considered as a large subset of the 'environment'
- Landscape involves both natural and physical resources themselves and also various factors relating to the viewer and their perception of the resources. These aspects seem to fit within 'amenity values' and into the category of "*social ... and cultural conditions which affect the matters in paragraphs (a) to (c) or which are affected by those matters*" within the Act's definition of environment.
- 'Landscape' is a link between specific physical resources and the environment in a holistic sense. It comprises both a grouping of natural and physical resources and a sentic response to the grouping of physical / natural components influenced by social, economic, aesthetic and cultural values / conditions.
- The potential 'double counting' of matters in relation to sections 6 and 7 is not of undue concern as the context in which such matters are addressed is usually

different. Those sections do not deal with issues once and once only, but raise issues in different forms from different perspectives, and in different combinations.

This consideration highlights the overlap between these definitions and concepts and points out, or at least implies, that this is a reflection of the complexity of the environment and our response to and interaction with it. The idea of landscape as a large sub-set of the environment reflects that complexity. In the end the Court was not satisfied with the dictionary definitions of `landscape' as these were considered simplistic or limiting by adopting a `views of scenery' approach. The Court, after discussing definitions and considering the relationships between landscape, amenity values and environment (refer 3.3 above) returned to its (slightly modified) criteria for assessing the significance of landscape which it first stated in **Pigeon Bay Aquaculture Limited v Canterbury Regional Council**, namely

a) the natural science factors -the geological, topographical, ecological and dynamic components of the landscape;

(b) its aesthetic values including memorability and naturalness;

(c) its expressiveness (legibility): how obviously the landscape demonstrates the formative processes leading to it;

(d) transient values: occasional presence of wildlife; or its values at certain times of the day or of the year;

(e) whether the values are shared and recognised;

(f) its value to tangata whenua;

(g) its historical associations.

It can be seen from this list that landscape is being viewed by the Court as something more than a view of an area such as one might experience from viewing a painting or photograph. An analysis of the setting of a landscape and of the natural patterns, processes and elements at play in the landscape are all relevant in assessing its character and value. This involves some interpretation of the significance of ecological patterns and processes in the landscape.

Assessments may also involve an analysis of the experiential aspects of a landscape, ie. what a person or persons experience when they are within or viewing a landscape. Such an analysis assists in developing a broader and deeper understanding of a particular landscape.

This approach can be contrasted with one that identifies the overt visual components of a landscape and makes an assessment on the degree of modification that has or will occur within it. From this assessment the sensitivity of that landscape to change is derived.

Obviously the viewed components of a landscape are the basis of landscape but they are increasingly being given an ecological and cultural interpretation. This approach was used by the Court in **Director General of Conservation v Marlborough District Council" and Browning v Marlborough District Council** where areas experiencing regeneration of indigenous vegetation were involved. The Court in assessing the impacts of marine farming acknowledged the processes at work in the landscape rather than viewing it as a snapshot in time.

These varied approaches to landscape assessment, and the often pivotal role of landscape evidence in Environment Court cases, has resulted in landscape assessment and the landscape profession coming under increasing public, professional and judicial scrutiny.

4.1 The Interpretation Of 'Natural' Landscape Values

Section 6(b) requires recognition and provision for the protection of outstanding natural features and landscapes from inappropriate subdivision, use and development. The Court in the Wakatipu Environmental Society case confirmed that 'outstanding' and `natural' qualify both features and landscapes. The question of what constitutes an outstanding landscape has already been addressed. This leaves the question of what is `natural'. The following passage from **Harrison v Tasman District Council** is often quoted by the Court in this regard:

> *"The word 'natural' does not necessarily equate with the word pristine' except in so far as landscape in a pristine state is probably rarer and of more value than landscape in a natural state. The word 'natural' is a word indicating a product of nature and can include such things as pasture, exotic tree species (pine), wildlife ... and many other things of that ilk as opposed to man-made structures, roads, machinery." (p.197)*

The interpretation of the term 'natural' has been further developed by case law relating to coastal areas. Section 6(a) refers to

"The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use and development."

Consideration of `natural character' in the coastal cases (in particular the marine farming cases) has clarified that it is 'naturalness' which is being considered not the extent of modification. This naturalness can encompass any of the following:

- maintenance of original landform,
- vegetation cover, particularly indigenous vegetation, and other ecological patterns,
- water bodies,
- lack of built elements and human influences,
- remoteness.

In the Wakatipu Environmental Society case, the Court said:

"The absence or compromised presence of one or more of these criteria does not mean that the landscape is non-natural, just that it is less natural. There is a spectrum of naturalness from a pristine natural landscape to a cityscape." (p.52)

In **Browning v Marlborough District Council** the Court stated that:

"The experiential recognition of what is natural character and a landscape worthy of protection goes not to the matter of tasteful subjective judgement but to a recognition that the dominant land patterns on the landform consist of scrub and regenerating forest uncluttered by buildings or jarring colours, and an unencumbered land/sea interface". (p.7)

This case was referred to in the Pigeon Bay case where the Court indicated this was an important passage because it:

"……distinguishes the completely subjective aesthetic assessment from a less subjective (but by no means value -free) assessment of the `naturalness' of the landscape, or in this case the coastal environment. We consider the aesthetic criterion needs to be qualified in that way by Councils and by the Court." (p.32)

At times 'naturalness' has been used comparatively by the Court, assessing one area against another. In **Chance Bay Marine Farms Limited v Marlborough District Council Court** the noted the sharp contrast between two bays, one which was a rather private, enclosed bay without structures and the other where the landscape contained mussel farming structures.

In this case and other marine farming cases (e.g. **McLaren v Marlborough District Council**) the Court has stated that the fact that the proposal is to develop in a bay where there are no marine farms is significant as there are comparatively few areas within the Sounds where there are no marine farms. The Court is therefore making a comparison with less `natural' areas (due in these cases to structures on the water's surface) concluding that this makes the non-farm bays even more valuable as recreational and landscape assets.

The spatial context of a landscape has been found to be critical in a number of cases. In the Chance Bay case, Kaikaiawaro Fishing case and in **Thompson v Queenstown - Lakes District Council** the appellants all argued that the proposal should be viewed in its large setting, which was already subject to modification. The Court however in these cases rejected the concept of evaluating the landscape values of one bay against an overall generalised landscape of the surrounding area. Rather they chose to consider each of the bays affected by development in their own right. The cumulative impacts of the proposal were also considered.

This approach reinforces the experiential aspect of landscape with meaningful boundaries of a landscape to be used for the purpose of assessment of impacts being determined on the basis of the people experiencing those impacts, not on the basis of someone carrying out an overall visual assessment of a general area. The Natural Character study previously referred to provides further useful analysis of naturalness and natural character.

3. Legislation & Strategic Guidelines

Since October 1991, the *Resource Management Act* has been the primary instrument of resource and land use management in New Zealand. In this role, it has been supported by the country's only national policy statement - that on management of the coastal resource - and within the Auckland Region is supported by the recent *Hauraki Gulf Maritime Park Act 1992* and the Department of Conservation's "*Conservation Management Strategy 1993-2003*".

3.1 Resource Management Act 1991

The RM Act largely addresses the country's landscape in Part II - "Purpose and Principles".

Under section 5 of Part II, the Act states its purpose as promoting "... *the sustainable management of natural and physical resources.*" "Natural and physical resources" are defined by the act as including "*land, water, air , soil, minerals, and energy, all forms of plants, animals (whether native to New Zealand or introduced), and all structures*". Landscape is the embodiment of a combination of these components and can therefore be considered a resource in itself. The Act's definition of "Environment" incorporates human perception and appreciation of the landscape through "amenity values" and reference to social, economic, aesthetic, and cultural conditions.

"*Sustainable management*" is defined as: "*managing the use, development, and protection of natural and physical resources in a way or at a rate, which enables people and communities to provide for their social, economic and cultural wellbeing and for their health and safety while -*

a) *Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*

b) *Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*

c) *Avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

Section 6, "**Matters of national importance"**, is specific in stipulating that all persons exercising functions and powers under the Act shall recognise and provide for the following matters of national importance:

a. ***The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:***

b. ***The protection of outstanding natural features and landscapes from inappropriate subdivisions, use, and development:***

c. *The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna: ..... [author's emphasis]*

A significant requirement under the Act is therefore to assess the landscape of territorial areas, to specifically examine the character of coastal environments and to identify outstanding landscapes.

Section 7, "**Other matters"**, requires those exercising functions and powers under the Act to have particular regard to:

a. *Kaitiakitanga*
b. *The efficient use and development of natural and physical resources:*
c. ***The maintenance and enhancement of amenity values:***
d. *Intrinsic value of ecosystems:*
e. ***Recognition and protection of the heritage values of sites, buildings, places, or areas:***
f. ***Maintenance and enhancement of the quality of the environment:***
g. *Any finite characteristics of natural and physical resources: ..." [author's emphasis]*

Reference to the definitions of the key words in these clauses illustrates that the visual landscape and heritage landscapes and their management are central components of the environment required to be considered under Section 7 of the Act.

3.2 New Zealand Coastal Policy Statement 1994

The purpose of the Coastal Policy Statement is set out in Section 56 of the Resource Management Act which states:

> *The purpose of a New Zealand coastal policy statement is to state policies in order to achieve the purpose of this Act in relation to the coastal environment of New Zealand.*

Of particular relevance to the coastal landscape is Chapter 1 - National Priorities For The Preservation Of The Natural Character Of The Coastal Environment including protection from inappropriate subdivision, use and development.

Policy 1.1.1

It is a national priority to preserve the natural character of the coastal environment by:

(a) encouraging appropriate subdivision, use or development in areas where the natural character has already been compromised and avoiding sprawling or sporadic subdivision, use or development in the coastal environment;

(b) taking into account the potential effects of subdivision, use, or development on the values relating to the natural character of the coastal environment, both within and outside the immediate location,

(c) avoiding cumulative adverse effects of subdivision, use and development in the coastal environment.

Policy 1.1.2

It is a national priority for the preservation of the natural character of the coastal environment to protect areas of significant indigenous vegetation and significant habitats of indigenous fauna in that environment by:

(c) protecting ecosystems which are unique to the coastal environment and vulnerable to modification including estuaries, coastal wetlands, mangroves and dunes and their margins; and

(d) recognising that any other areas of predominantly indigenous vegetation or habitats of significant indigenous fauna should be disturbed only to the extent reasonably necessary to carry out approved activities.

Policy 1.1.3

It is a national priority to protect the following features, which in themselves or in combination, are essential or important elements of the natural character of the coastal environment:

(a) landscapes, seascapes and landforms, including:

(i.)significant representative examples of each landform which provide the variety of each region;

(ii.)visually or scientifically significant geological features; and

(iii.)the collective characteristics which give the coastal environment its natural character, including wild and scenic areas;

Policy 1.1.5

It is a national priority to restore and rehabilitate the natural character of the coastal environment where appropriate.

Chapter 3, addressing 'Activities Involving The Subdivision, Use Or Development Of Areas Of The Coastal Environment' contains additional policies relevant to the management of coastal landscape resources:

3.1 Maintenance and enhancement of Amenity Values

Policy 3.1.1
Use of the coast by the public should not be allowed to have significant adverse effects on the coastal environment, amenity values, nor on the safety of the public nor on the enjoyment of the coast by the public.

Policy 3.1.2
Policy statements and plans should identify (in the coastal environment) those scenic, recreational and historic areas, areas of spiritual or cultural significance, and those scientific and landscape features, that are important to the region or district and which should therefore be given special protection; and that policy statements and plans should give them appropriate protection.

Policy 3.1.3
Policy statements and plans should recognise the contribution that open space makes to the amenity values found in the coastal environment, and should seek to maintain and enhance those values by giving appropriate protection to areas of open space..

3.2 Providing for the Appropriate Subdivision, Use and Development of the Coastal Environment

Policy 3.2.1
Policy statements and plans should define what form of subdivision, use and development would be appropriate in the coastal environment, and where it would be appropriate.

Policy 3.2.2
Adverse effects of subdivision, use or development in the coastal environment should as far as practicable be avoided. Where complete avoidance is not practicable, the adverse effects should be mitigated and provision made for remedying those effects, to the extent practicable.

Policy 3.2.4
Provision should be made to ensure that the cumulative effects of activities, collectively, in the coastal environment are not adverse to a significant degree.

4. Background: The Perceived Landscape

Traditionally, landscape assessments addressing the perceived or visual / aesthetic landscape have been fraught with accusations about being ‘subjective’ and / or reliant upon, usually international, research that is difficult to substantiate in New Zealand. In general, therefore, it is accepted that any assessment method must be supported by an body of knowledge and experience that makes it defensible in the course of application within the resource management environment. At a more 'down to earth' level, any methodology must also:

- be practical in terms of its implementation: it would, for example be quite impractical to bus of somehow convey a large group of people to every part of the Auckland Region to gauge their response to the diversity of landscapes found within it;
- be sufficiently simple and logical that both the assessment method and its results can be explained to, and interpreted on behalf of, the general community of resource managers and decision-makers in New Zealand (apart from the more abstract / theoretical domain of specialist landscape architects, planners and environmental psychologists);
- be clear about its objectives in terms of key resource management goals, such as addressing key Part 6 & 7 matters in the Resource Management Act and just how the assessment findings will address such matters; and
- meet a very pragmatic need for validation of planning objectives, policies and methods derived from landscape analysis, assessment and evaluation.

4.1 The 1995 Whangarei District Landscape Assessment (LA4)

The 1995 study was undertaken during the early stages of transition into an ‘effects based’ planning regime under the resource Management Act an had a very strong focus upon interpretation and evaluation of different landscapes as a whole, in a cognitive / perceptual

sense. Thus, it relied heavily upon research carried out in the United States by Rachel and Stephen Kaplan into landscape perception and preferences - based on the two dimensional 'picture plane' and three dimensional 'spatial array'. In conjunction with the findings of other historic assessments, such as the University of Massachusetts' METLAND study (under the guidance of Dr Julius Fabos in the 1970s), this led to LA4's assessment employing a rating system built around short list of criteria to identify the key characteristics of individual landscape character units.

Although focusing strongly upon Landscape Values, essentially related to scenic / perceptual appeal, the assessment also addressed Visual Absorption Capability in order to provide an indication of different areas' susceptibility or sensitivity to development and modification. In addition, the study also sought to address a range of factors related to both Values and VAC, including:

- "***Landscape Heritage****":* the landscape of any area (the Auckland Region, New Zealand, wherever) has certain characteristics and features that render it unique and different from the rest of the world, eg. through vegetation, particular landforms, even cultural artefacts like old pa sites. The 'remnant' elements and compositions that capture the particular essence of an area are therefore extremely important.
- "***Rarity****":* in similar fashion, certain locations display qualities that are important because they are relatively rare, eg. the geysers and mud pools of Rotorua, and the high dunes of South Kaipara Heads and Mangawhai. Sometimes rarity is natural while at other times it is imposed - with modification of the landscape through urbanisation, agriculture and forestry resulting in a loss of certain types of landscape and overall diversity.
- "***Xposure / Visibility***": the fact that some landscapes are more Xposed to the general community than others, whether because of a locality's relationship to areas of housing and work or to transportation corridors, means that there is considerable variation in the degree to which society is aware of any landscape and change within it - which in turn affects the community's response to both the landscape and change.

Part One of the analysis for each landscape unit, addressing landscape values, therefore employed the following criteria:

AESTHETIC VALUE

- ***Vividness****: How immediately impressive and memorable is the landscape as a result of its visual distinctiveness, diversity or other factors - both compositional and geo-physical?*

- ***Complexity / Diversity**: To what extent does the unit have a sense of richness and interest about it arising from the diversity of elements found within it - without that diversity leading to discontinuity?*
- ***Cohesion**: Is there a continuity of key statements / patterns / themes / accents that give the landscape both character and a sense of unity?*
- ***Legibility**: To what extent is it possible to develop a clear mental picture of the unit's landscape because of the clear definition of features and patterns within it that emphasise its 3 dimensional structure (layering); and identifiable landmarks (points of focus and reference)?*
- ***Mystery**: Does the landscape's spatial structure and array of elements promote a sense of sequence and 'enticement' through the unit's space: the promise of 'more to unfold around the next bend' - just beyond the landscape that is immediately visible?*

HERITAGE VALUE

To what extent does the unit reveal and convey a distinctive sense of identity because of:

- ***Endemic Associations**: Arising from natural elements in the landscape that contribute to the character and sense of place of the locality and Region, eg. the islands of the Hauraki Gulf, remnant Kauri forest*
- ***Cultural Associations**: Arising from man-made landscape elements that are distinctive and valued because of their association with both Maori and Pakeha cultures, eg. old pa sites, historic buildings*

UNIQUENESS / RARITY

- *To what extent is the unit or key elements within it rare and unique at the **District Level**?*

Part Two of the analysis process, focusing upon the physical character of each unit and the degree to which that influences the ability of a landscape to accommodate development / change, employed the following criteria:

VISUAL ABSORPTION CAPABILITY

- ***Land Uses**: How 'developed' is the existing landscape - from areas that are primarily native and natural to those which are highly developed and urbanised?*
- ***Vegetation Cover & Type**: How extensive and varied is existing vegetation cover - from no cover and monocultural dominance to a high level of vegetated cover and diverse species?*
- ***Topographic Type & Diversity**: Does the unit's terrain assist or limit viewing because of its character and the viewing angles that would typically arise between vantage areas and locations subject to modification - from the simplicity and openness of a plain or shallow ridgeline to incised foot hills with a high level of visual containment?*

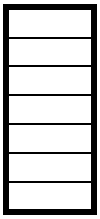
XPOSURE / VISIBILITY

How visually Xposed is the unit / sub-unit / view to the likes of:

- ***Residential Areas***
- ***Areas Of Recreational Use And Tourism Activity***
- ***Public Transport Routes And Tourist Routes***
- ***Commercial Areas***

Ratings for individual criteria within both Parts One and Two were on a scale of 1 to 7, from least to most valued / vulnerable, and culminated in overall 'scores' on the following table:

OVERALL SENSITIVITY CLASSES



7. EXTREME SENSITIVITY
6. HIGH SENSITIVITY
5. SIGNIFICANT SENSITIVITY
4. MODERATE SENSITIVITY
3. LIMITED SENSITIVITY
2. LOW SENSITIVITY
1. NO / VERY LOW SENSITIVITY

In addition, the assessment sought to identify those specific physical elements which contributed to the Value (Part One), Vulnerability (Part Two) and Overall Sensitivity ratings for each unit. Accordingly, the following were physically described for all coastal landscape units:

- *Physical Elements that Enhance Landscape Character and Value*
- *Patterns and Compositional Factors that Enhance Landscape Character and Value*
- *Elements and Patterns that Adversely Affect Landscape Character and Value*
- *Elements that Contribute to Visual Absorption Capability*
- *Audiences Xposed to the Unit and their Relative Scale*

These components of the landscape and factors contributing to its relative sensitivity were further categorised so as to indicate whether they are **critical**, **important**, or just **evident** in terms of the ratings attributed each unit.

Based on these findings, landscape units were grouped into 'landscape type' categories, with the aim of determining the relative importance that should be attached to different types of landscape within each study area and that of their individual components. As well, the likely sensitivity of particular units and landscape categories to different forms of development could be gauged and management policies developed to address the effects of development

/ change in relation to specific, even multiple, landscape components that would, in turn, affect landscape values.

The ratings system identified all landscape units rated "6" or "7" as outstanding, with reference to the statutory need to protect 'outstanding landscapes' in accordance with Part 6 (b) of the Resource Management Act. At the next level down, units rated "5" were deemed to be "Significant" at the district level.

5. Landscape Assessment Theory

5.1 General Introduction

A wide range of landscape assessment procedures and methods have been explored and applied over the last 30 years, primarily in the USA and Western Europe. The objectives underpinning many of the approaches employed are highly variable, although most focus upon the 'perceived landscape' rather than the landscape as a physical or ecological entity. Even so, the interplay of physical variables and human, psychological, responses to them have been a constant feature of much of the recent perceptual evaluations.

The following section provides an overview of the diversity of landscape assessment methods that have been employed up to the mid 1990s. An accompanying paper (**Appendix A**), courtesy of Jo Anna Wherrett in the McCauley Institute in Scotland, addressing evaluation methods, focuses more specifically upon methods for engaging the general public in the identification of public attitudes to, and preferences for, different landscapes.

Since the 1980s a considerable amount of research has sought new methods to explain / describe landscapes and to ascribe values to them. Insofar as the current priority is for exploration of methodologies which address the perceived (as opposed to physical / ecological) landscape, the following is a brief outline of some of the major theoretical options for future assessment and, in particular, the allocation of perceptual values to landscape:

Currently, there appears to be a fundamental divergence of opinion in 'landscape circles' as to whether landscapes have intrinsic or objective beauty, which may in some way be objectively measurable, or whether scenic beauty is a value that can only be subjectively interpreted and ascribed to particular areas / localities. Thus, while physical geographers have devised ways of measuring landscape (often in a parametric fashion) to reflect and capture visual qualities, human geographers have probed individual and societal attitudes toward landscape and the meanings associated with it.

Orland *et al* (1995) have described qualitative approaches as those which focus upon evaluating the complexity of landscape using the judgements of panels of human subjects, and quantitative approaches as those which measure physical characteristics of the visual landscape directly.

On the physical / objective side, Buhyoff and Riesenmann (1979) have presented evidence that certain landscape dimensions can be used successfully as a basis for evaluation of landscape values, and that such values can be measured from specific landscape dimensions. There is also an increasing interest in the use of mapped data and geographic information systems to assess visual landscape variables using reproducible methods over wide areas or catchments. Some recent research efforts have further indicated that the public's scenic preferences can be assessed objectively and quantitatively. This research has also demonstrated that public perceptions can - to an extent - be related to and predicted using the measurement of environmental attributes of a tangible nature.

5.2 Landscape Evaluation Methods

Numerous techniques of landscape evaluation have been devised in recent years, reflecting a spectrum that stretches techniques based around the subjective assessment of landscape quality by individuals or groups to those using the physical attributes of particular study areas as surrogates for personal perception. The following are brief, summary descriptions of each:

Public Preference Models

The recent upsurge in public interest in preserving the beauty of public lands has resulted in development of scenic assessment based on public input. Indeed, it can logically be argued that the best source of data upon community values in relation to such a subjective matter as landscape quality is the general public itself. Although planners may claim that it is their duty to guide public taste in these matters, the visual attractiveness of the landscape is ultimately a product of the aggregated opinions of all the individuals concerned with the landscape.

Typically, the visual quality or value of a landscape is rated on the basis of an observer's individual preference for the whole landscape, ie. judgement of the landscape in totality, as opposed to measurement techniques which rely on the identification and application of key variables / parameters to explain variations in landscape quality.

Questionnaires or verbal surveys are the most commonly used non-quantitative method for sampling scenic preference of various groups. They are a valuable source of quick information but accuracy is often sacrificed for speed. As such, they tend to be more useful for determining preferences for extremely divergent types/categories of landscape. As an alternative to straight questionnaires, visual stimuli are often at the core of such evaluations, employing photographs or slides. Although perceptions still vary, the degree of variation is often less than that associated with verbal descriptions.

Hardly surprising, a variety of difficulties arise when carrying out such evaluations. Past studies show that the personality of the observer and their location affects what they observe, as does the duration of observation, the socio-economic profile of the observers, the type of physical characteristics of the landscape, its complexity and the dynamics of its components. Concerns also relate to the psychological basis for such evaluations; the validity of their quantitative or semi-quantitative results; and their validity in terms of accurately representing society's views.

Descriptive Inventories

Descriptive inventories comprise the largest category of techniques for assessing scenic resources; they include both quantitative and qualitative methods of evaluating landscapes by analysing and describing their component parts. Scenic elements (such as landform and visual effects), vegetative patterns and so forth, are typically identified with either approach then described and/or rated. The ratings are primarily based on traditional values within the landscape architecture profession and arts / design professions. Although such methods can provide broad assessments of landscape quality and a landscape inventory based on subjectively-selected but objectively-applied criteria, the objectivity of their application and their precise, often quantitative, results disguise their underlying subjectivity.

The descriptive inventory approach contains several assumptions. The first is that the value of a landscape can be explained in terms of the values of its components. Another is that scenic beauty is embedded in the landscape components, ie. that it is a physical attribute of the landscape, almost regardless of the issue of composition. It also tends to ignore the fact that evaluation of scenic beauty is also dependant upon the observer (Arthur *et al*, 1977).

Formal Aesthetic Models

The basic theory of the formal aesthetic model is that aesthetic values are inherent in the physical features of the landscape. In this instance, such properties are defined as basic forms, lines, colours and textures, and their interrelationships. In this model landscapes are first analysed in terms of their formal abstract properties; the relationships between them are then inspected to classify each area in terms of variety, unity, integrity or other complex formal characteristics. Due to the formal training required for this, the method is almost always applied by an expert, usually a landscape architect.

Ecological Models

Within the ecological model, the environmental features that are relevant to landscape quality are primarily biological or ecological. The landscape is characterised in terms of species of plants and animals present, ecological zones, successional stage or other indicators of ecological processes. Humans are characterised as users of the landscape, and their contribution to it is typically indicated in the form of negative aesthetic impacts - hardly surprising as a major underlying assumption of the ecological model is that landscape quality is directly related to naturalness, or ecosystem integrity. The validity of this model depends upon the assumption that "natural" areas undisturbed by humans are highest in landscape quality.

Ecological models tend to be designed for specific areas and are therefore difficult to apply to landscapes in general; they are often more sensitive in distinguishing between natural and human-influenced environments than in making distinctions within either of those broad classes and their reliability depends on the consistency and accuracy of the individual applying the method, with most such assessments carried out by one or two "ecological expert".

Psychological Models

The psychological approach has been used in many studies where multi-dimensional analyses of people's preferences for different landscapes have been undertaken. These studies have demonstrated that various psychological constructs, such as complexity, mystery, legibility and coherence (R & S Kaplan), are important predictors of human landscape preferences. The psychological model refers to the feelings and perceptions of people who inhabit, visit, or view the landscape, with a high-quality landscape evoking positive feelings, such as security,

relaxation, warmth, cheerfulness or happiness, whereas a low-quality landscape is associated with stress, fear, insecurity, constraint, gloom, or other negative feelings.

Because psychological methods use multiple observers and yield one or more quantitative scale values for each assessed landscape, their reliability and sensitivity can be determined to a reasonable degree of precision and the fact that this method builds on the reactions and judgements of the people who actually experience and / or use the landscapes is also an advantage. Again, however, concern persists about the validity of the samples employed, the representativeness of values and reactions elicited from such sample groups (in relation to the wider community) and the strength of the correlation between landscape elements (in terms of legibility, mystery, etc) and the feelings associated with them.

Phenomenological Models

The phenomenological model places even greater emphasis on individual subjective feelings, expectations, and interpretations. Landscape perception is conceptualised as an intimate encounter between a person and the environment, and the principal method of assessment is the detailed personal interview or verbal questionnaire. As a result Phenomenological models tend to avoid ranking of landscapes in terms of scenic beauty.

Phenomenological approaches have largely sacrificed reliability in favour of achieving high levels of sensitivity by emphasising very particular personal, experiential and emotional factors. As such, this model represents the extreme of subjective determination of relevant landscape features. It fails to establish systematic (community based) relationships between psychological responses and landscape features. However, by emphasising the unique role of individual experiences, intentions, and expectations, the phenomenological model does serve to point out the importance of the personal human relationship with the landscapes that are encountered.

Quantitative Holistic Methods

Quantitative holistic methodologies combine two approaches: quantitative public preference surveys and landscape features inventories. Measures of landscape quality are typically systematically related to physical / biological and social features of the environment so that accurate predictions of the implications of environmental change can be made.

These predictive models have tended to be used to predict scenic quality based on the presence of quantifiable landscape attributes. Thus, Psychophysical modelling uses measurements of physical landscape features to predict people's preferences for the overall visual quality of the landscapes.

Traditional psychophysical models, while not "classifying" landscapes, are typically devised to make predictions about scenic preference or visual quality from variables which are often selected for their predictive, rather than "genuine" explanatory, ability. Surrogate component techniques are based on the identification of physical landscape components which can be compared with preference ratings, and - related to this - visual management systems aim to be able to both predict and explain scenic preference, their essential purpose being the prediction and assessment of impacts resulting from potential management alternatives / options.

Psychophysical Models

Psychophysical methods of landscape assessment seek to determine mathematical relationships between the physical characteristics of the landscape and the perceptual judgements of human observers. The relationships of interest are those between physical features of the environment (e.g. topography, vegetation, water etc.) and psychological responses (typically judgements of preference, aesthetic value or scenic beauty). Landscape features such as land cover, land use, forest stand structure, and arrangement are measured and then statistically related to scenic quality judgements. Models such as paired comparisons, Likert scales, and sorting and ranking scales are a means to evaluate scenes quantitatively, with multiple linear regression commonly used to determine these relationships.

Of all landscape assessments, these methods have been subjected to the most rigorous and extensive evaluation. They have been shown to be very sensitive to subtle landscape variations and psychophysical functions have proven very robust to changes in landscapes and in observers, consistently proving able to differentiate subtle changes in landscape values. They also provide a good understanding of public perceptions of scenic quality values / preferences, insofar as community 'sub-groups' can be relied on to represent the wider community's values.

However, the models require the full range of scenes to be selected to represent all of the physical characteristics used as predictors of scenic beauty. As a result, they can be expensive and time consuming to develop and are usually restricted to a particular landscape

type (such as forest or peri-urban landscapes in a particular area) and to a specified viewer population.

Surrogate Component Models

The basis of component techniques is the identification and measurement of those physical components of the landscape which are regarded as surrogates of scenic quality. The individual components are isolated, their identification and measurement discussed and their combined utility within existing techniques evaluated. Because component ratings are compared to overall preference ratings in these models, the contribution of particular components to scenic beauty can be measured in terms of explained variance.

Visual Management Systems

Another approach to the evaluation/assessment of visual resources is design-based, classification / assessment such as visual management systems (VMS). These are straightforward systems that use holistic analysis combined with the identification of observable physical landscape attributes to classify landscapes.

Typically, this involves the observation of landscapes and judgement of them by panels of persons representative of targeted populations. Using this system requires that a number of different landscapes are assessed and their physical characteristics evaluated to determine the correlation between ratings for the landscapes as a whole and the presence or absence of key physical elements. This can be done using colour photographs or slides, or even site visits to different landscapes.

5.3 Paradigms In Landscape Evaluations

On the basis of these core approaches to assessment Zube *et al* (1982) identified four general paradigms of landscape assessment. They are the **expert**, the **psychophysical**, the **cognitive** and the **experiential** paradigms.

- The Expert Paradigm involving evaluation of landscape quality by skilled and trained observers. Wise resource management techniques are assumed to have intrinsic

aesthetic effects that can be assessed using professional techniques, skill and experience.

- The Psychophysical Paradigm involving testing of either the general public's perceptions of landscape qualities and values or those of a selected population / sample group. The value of particular landscape components may also be tested in this fashion. Key physical landscape properties are assumed to the major determinants of public reactions to, and evaluations of, landscape values and character.

- The Cognitive Paradigm involves a search for human meaning associated with landscapes or landscape properties: the human observer's responses to a landscape and interpretation of its values is lent meaning by past experience, future expectation, and socio-cultural conditioning.

- The Experiential Paradigm considers landscape values to be based on the experience of the human-landscape interaction, whereby both are shaping and being shaped in an interactive process.

The cognitive paradigm differs from both the expert and psychophysical paradigms in terms of its theoretical foundation by attempting to explain why people prefer different landscapes. It attempts to bridge the gap between subjectivity and objectivity by using a theoretical model from which assumptions can be made and tested using empirical techniques (Kroh and Gimblett, 1992).

5.4 Landscape Components

The psychophysical and surrogate component techniques of landscape evaluation require that the landscape be subdivided into component parts. This can be done in many ways, similar to those found in the models previously discussed, from simple methods to more abstract definitions. Examples include:

- landform elements (Land Use Consultants1971),
- landscape patterns or themes (Hammitt *et al*, 1994; Linton, 1968),

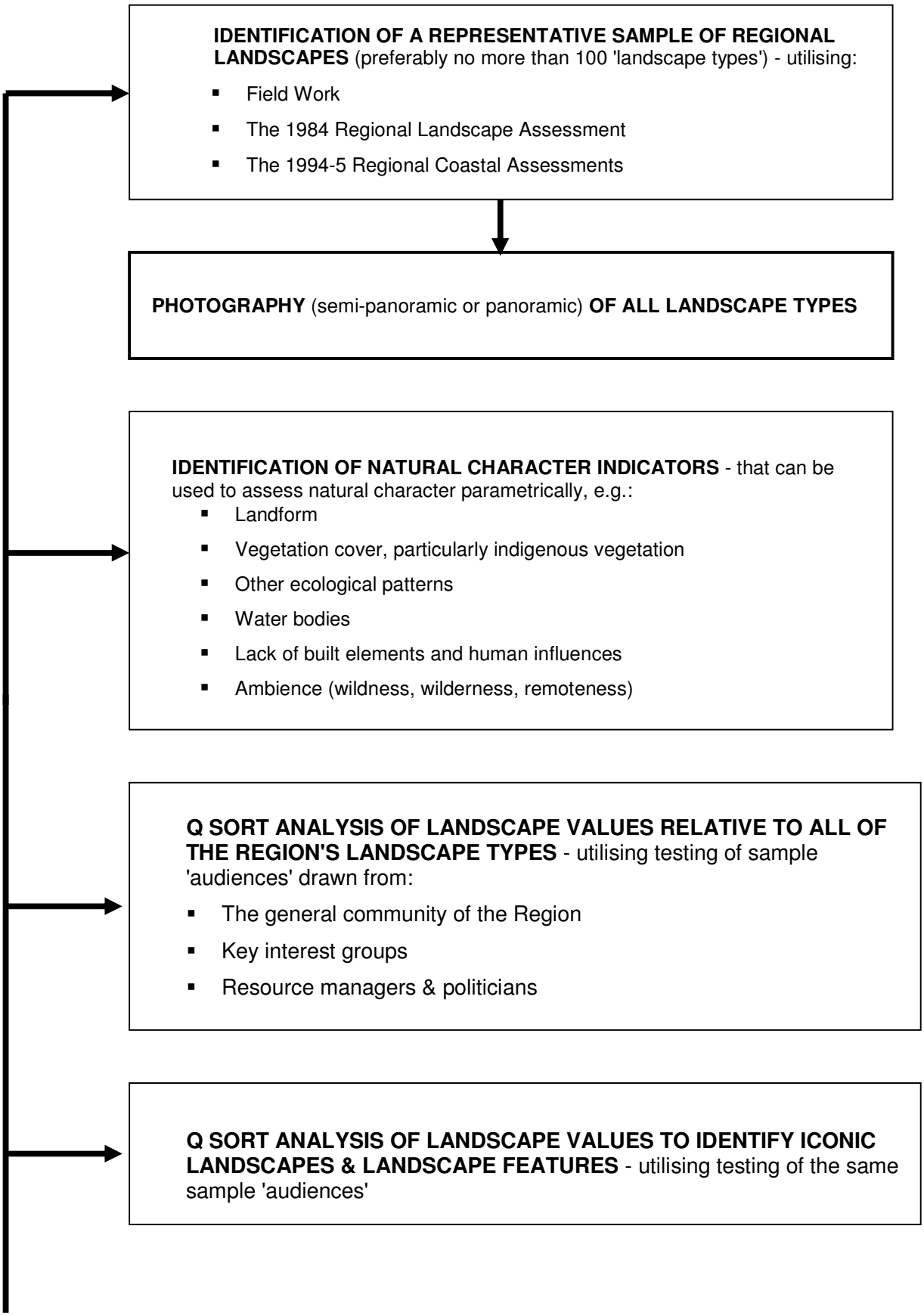
- landscape character (Crofts, 1975),
- landscape qualities (Palmer, 1983; Morisawa, 1971),
- dimensions (Propst and Buhyoff, 1980); and
- landscape preference predictors (Hammitt *et al*, 1994; Brush and Shafer, 1975).

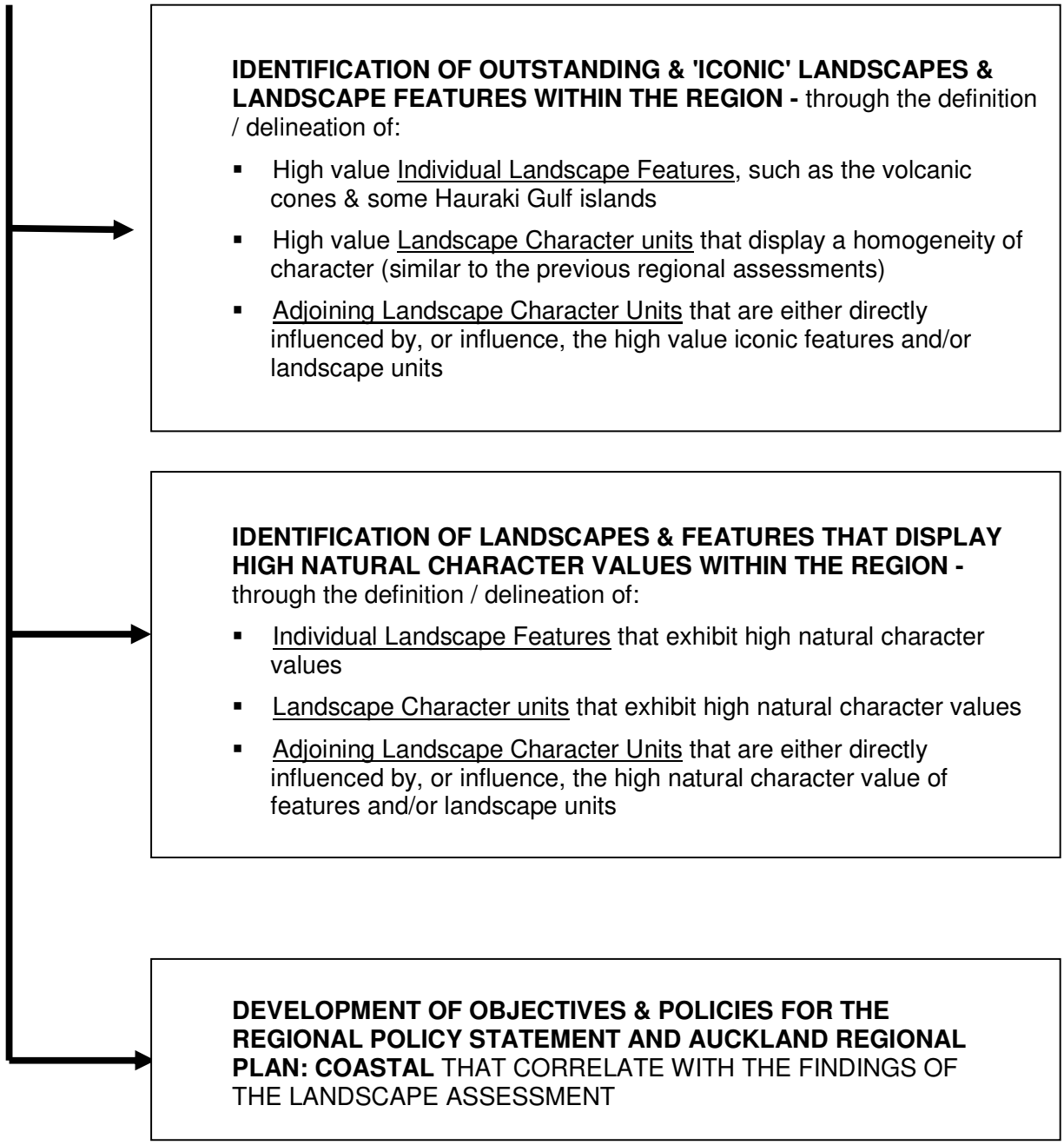
JoAnna Wherrett's paper (**Appendix A**) focuses specifically upon methods for engaging the general public in the identification of public attitudes to, and preferences for, different landscapes. In so doing, it also touches on such technical issues as the use of surrogate images for 'real' landscapes and the derivation of key variables from sampling that can then be extrapolated to give an indication of preferences - both for the wider community and the wider landscape. As such, many of the principles discussed in it are critical to the employment of public preference testing in landscape assessment.

6. Theory Into Practice - The Recent NZ Experience

With a closer focus upon New Zealand, a paper prepared by Simon Swaffield and R Burton in 1998 (***"Community Perceptions of Landscape Values In The High Country****", DOC Science Report December 2000*) - **Appendix B** - provides a detailed overview of landscape assessment methodologies in this country. Although focusing upon community perceptions, preference and policy development for the South Island High Country, the paper is valuable in the manner that it traverses the body of theory from a local perspective as the basis for narrowing down assessment method options. Thus, while exploring and categorising landscape assessment methods in a similar fashion to Wherrett, it does so with the specific goal of suggesting preferred approaches to evaluation in New Zealand.

For the most part, landscape assessment directed towards strategic policy and decision-making has adhered to the Expert Paradigm, with studies of the likes of the Canterbury and Hawkes Bay Regions, coastal parts of the Auckland Region, and the Wairoa, Hastings, Taupo, Western Bay of Plenty, Waikato, Franklin, Manukau, Thames-Coromandel, Rodney, Whangarei and Far North Districts all utilising Expert Analysis. However, the criteria employed in such work range from relatively simple geo-physical 'descriptors' to factors that have their origins in Psychophysical research. Yet local research into public perception of landscape values has been quite limited, despite the Environment Court's express desire for public participation and involvement in landscape assessments. Nevertheless, the desire for wider public participation in the assessment process has 'taken root' and, as a result, the 2004 **Auckland Regional Landscape Assessment** was recently completed employing the stages and components illustrated in table form overleaf, including "Q Sort" testing of public attitudes to different landscapes:


IDENTIFICATION OF A REPRESENTATIVE SAMPLE OF REGIONAL LANDSCAPES (preferably no more than 100 'landscape types') - utilising:
Field Work
The 1984 Regional Landscape Assessment
The 1994-5 Regional Coastal Assessments
PHOTOGRAPHY (semi-panoramic or panoramic) **OF ALL LANDSCAPE TYPES**
IDENTIFICATION OF NATURAL CHARACTER INDICATORS - that can be used to assess natural character parametrically, e.g.:
Landform
Vegetation cover, particularly indigenous vegetation
Other ecological patterns
Water bodies
Lack of built elements and human influences
Ambience (wildness, wilderness, remoteness)
Q SORT ANALYSIS OF LANDSCAPE VALUES RELATIVE TO ALL OF THE REGION'S LANDSCAPE TYPES - utilising testing of sample 'audiences' drawn from:
The general community of the Region
Key interest groups
Resource managers & politicians
Q SORT ANALYSIS OF LANDSCAPE VALUES TO IDENTIFY ICONIC LANDSCAPES & LANDSCAPE FEATURES - utilising testing of the same sample 'audiences'



6.1 The Auckland Regional Landscape Assessment 2004: Q Sort Analysis

The bulk of this process bears a 'family resemblance' to the assessment previously undertaken in 1982-4 for the Auckland Regional Council. This is particularly so in relation to

the identification of a representative sample of landscape types and the delineation / definition of Landscape Character Units. Even the use of a parametric approach to identify areas (ultimately landscape units and individual features) that display high natural character values bears a strong resemblance to the measurement of *Sensitivity To Modification* in the 1984 study and the use of key criteria in the subsequent coastal assessments (and Whangarei District Assessment).

However, the shift in focus (compared with 1984) - away from the entire region towards the identification of 'Outstanding' and 'Iconic' landscapes - places a great deal of emphasis and reliance upon the evaluation stages of the process. In this respect, the Q Sort methodology still remains somewhat of a 'black box' for the great bulk of landscapes architects and landscape managers. Consequently, the following section (written for the Auckland Regional Council's Technical Assessment Report by Simon Swaffield of Lincoln University: pp. 152-157) attempts to 'de-mystify' Q Sort and explain more fully its role in the (Auckland) regional landscape assessment.

> *The essential criterion for a survey that is intended to lead to landscape policy outcomes is credibility (Swaffield and Foster 2000). This creates a tension in specifying sample design for Q method, because there is a significant difference between the technical requirements of sampling for Q method, and the 'popular' ideals about sampling which are likely to inform public, political, and even judicial interpretations of what is credible. "Popular" ideals are most typically derived from Xposure to 'R' type public opinion surveys, which are technically very different from Q Sort.*
>
> *The best way to describe the tension is to compare 'Q' with 'R' approaches. In "R" surveys the aim is to ask a sample of people from a population their views on a predetermined and seemingly straightforward question, and from this, to predict how the population as a whole would answer the same question. It is therefore focused upon how particular traits (e.g. a preference for a particular product or politician) are expressed across the population. To achieve this, it is necessary to select a sample that is statistically representative of that population. Typically this is achieved by taking random samples where the size of the sample relates to the accuracy of the*

assessment of population characteristics. Up to a certain point, the larger the sample, the more accurate the assessment.

The basic principles of 'R' surveys are well established and are intended to achieve an 'objective' measure of preference. When applied to landscape issues, however, "R" can become quite complex and contentious, as in addition to the statistical sampling of respondents, it becomes necessary to break up 'landscape' into a whole set of independent measurable variables (See for example Mosley 1989). The validity of doing this has been challenged (e.g. Carlson 1977, 1995).

Q method is quite different. It was developed as "the scientific study of subjectivity" and aims to profile or characterise the subjective values of individuals taken as a whole. By comparing the profiles of different individuals it develops an understanding of the different ways of thinking about an issue that are present in a defined community. In regard to landscape, it enables landscape to be evaluated as a holistic phenomenon or experience. One advantage is that the technical requirements for the survey are typically less restrictive than those of 'R' surveys. In particular, Q does not attempt to predict population wide characteristics, and so the numbers and conditions of the survey are less onerous. Technically, Q is based upon 'theoretical' sampling, driven by the nature of the research question rather than by the statistical requirements of prediction.

In determining a sampling strategy for Q method, there are two key technical aspects to the selection of respondents: the size of the sample of respondents, and their make up.

Sample Size

In practice Q is based upon analysis of the way respondents evaluate a set of statements about a 'real world' situation. In the ARC study, this is represented by their evaluation of photographs of different landscape settings. The statistical analysis compares the pattern of responses of each individual with every other individual surveyed, and identifies distinctive types of response (called factors) which are common to a group of people with a similar point of view. With a small number of respondents, each individual's contribution to the characteristics of the factor is

relatively influential, and the characteristics of each factor may change as additional individuals are added to the analysis. However as an increasing number of individuals 'load' onto any particular factor it becomes increasingly stable (that is, it doesn't change its profile when additional responses are added to the analysis).

Our experience is that factors start to stabilise when they reach 15-20 respondents loading upon them. If only one dominant factor emerges from an analysis, this means that when 15 people have loaded on that factor, there is a high degree of confidence that the characteristics of the factor represent a coherent point of view in the community. If more than one factor emerges, then proportionally more respondents overall are needed in order to ensure that each factor is stable.

However not all respondents load significantly on a factor. The analysis identifies the correlation coefficient between each individual's responses and the characteristics of each factor, and only includes those individuals in a factor who meet a specified level of significance. Hence a survey typically needs more respondents in total than the number required to stabilise the identified factors. In our recent work, around 2/3 of respondents have loaded significantly upon identified factors. In a two factor analysis, that suggests a maximum need for a sample of around 45 (ie: 15 for each of the two factors, plus a further 1/3 overall (ie 15)).

It is also possible to adjust the level of significance at which respondents load on a factor. It is normal to use the 95% level, but this is not essential. A lower level of significance would result on a higher proportion of respondents loading on the identified factors, although each factor may be less stable.

The operational problem in planning a survey is that there is no a priori basis upon which to judge how many factors will emerge. This only becomes apparent as the analysis proceeds. Hence the sampling has to be open ended, and continues until the factors that emerge are stable. Previous studies suggest it unlikely that there will be more than 4-5 significant factors. The absolute maximum sample size required for totally stable factors in a complex Q sort can therefore be estimated at around 100, and in practice is likely to be significantly less. Our published work over the past few years has never involved more than 100 respondents.

This is, however, a technical evaluation. The political evaluation of what is needed to be credible is quite different, and as noted above may be based more upon 'R' statistical requirements than upon 'Q'. From this perspective, it may be prudent to plan for a somewhat larger sample than is needed technically. This may be most influenced by the next issue, which is selection of respondents.

Selection of Respondents

In 'R' surveys the sampling aim is to be able to predict the occurrence of specified traits across the population, and hence the selection of respondents must be representative of the population as a whole. In practice, when there are distinct categories of interest within the population, this is typically achieved by stratified random sampling (ie selecting respondents at random from within the broad categories in a population). These categories might encompass age categories, gender, socio- economic status and ethnicity.

In 'Q' method, the selection depends upon the articulation of the underlying research question. The overall question in this study is what types and degrees of natural features and landscape in the Auckland Region are recognised as outstanding, and what qualities make them outstanding. There are also more detailed questions such as how does the regional community assess the newly emerged landscape types (e.g. lifestyle blocks), and has greater population diversity lead to a divergence of evaluation of what constitutes landscape quality?

To answer these questions, 'Q' surveys typically identify key interest groups in a community and ensure representation from each group. One key difference from 'R' surveys is that in 'Q' the results cannot be "biased" in the same way as 'R', as no claims are made about the overall population characteristics being investigated. 'Q' results are never presented in the form that, for example, 60% of the population prefer landscape X. Instead they will say, one view held by people in the community is that landscape X is outstanding, or words to that effect. However 'Q' results could be seen to be incomplete if a group that was not surveyed held a distinctly different view from that or those which were reported.

In the 1984 ARC survey, the sampling was by intercept, and the final profile of respondents was compared with the regional demographic profile. In the 2001 ARC survey, there are two possible approaches. First, to repeat the 1984 approach and adopt an 'R' approach which seeks a statistically representative range of respondents from across the regional community. This requires specification of the categories regarded as significant. This might include geographical location along with age, gender, socio-economic status and ethnicity. The drawback with this approach is that it would almost inevitably involve more respondents than are technically needed to identify stable factors, and is not theoretically congruent with the nature and purpose of Q method.

An alternative would be to specify a range of relevant interest groups, and ensure representation from each. For example, tangata whenua, developers, conservation groups, environmental professionals, the wider business community etc. The problem with this second approach is that in a diverse community such as Auckland Region, significant groups could be overlooked in the selection, particularly those not typically represented by well organised advocacy bodies (e.g. elderly, children and teenagers, lower socio- economic sectors, immigrants).

Specification of a "representative' sample is also as much a political as a technical question. From a technical perspective, it is notable that in the half dozen or so Q studies undertaken recently in NZ, there has seldom been a close relationship between particular factors and highly defined interest or population groups. More typically, a diversity of people has loaded on each factor. Hence increasing the 'representativeness' of the sample would have had no material effect upon the factors identified. (The slight exception to this has been in the tourism related studies. Here there has been some relationship between the distinctive characteristics of each factor and certain variables in the respondents who load upon them, for example insider/outsider relationships (ie: local/tourist), cultural origin, gender and to some extent age).

It is also of relevance that the 1984 study found only one dominant landscape preference factor amongst nearly 2000 respondents, the content of which was consistent with wider research findings upon landscape evaluation. Palmer (1997)

identified significant stability in a repeated Q sort over 15 years in NE USA, and research in the Mackenzie has found stability over shorter periods. It could therefore be hypothesised that there will not be dramatic differences between different respondents in 2001 in their evaluation of outstanding landscapes. If this applied in Auckland it would lead to a single factor stabilising relatively quickly. It would also provide strong support for the view of the Environment Court that outstanding landscapes should be reasonably evident to all concerned. If this was the outcome, then the study would achieve its practical objective very rapidly, and much of the respondent sampling beyond the first 15-20, irrespective of their characteristics, would be technically redundant.

On the other hand, with the significant in migration of people to the region, it may be that differences do now emerge based upon differing degrees of familiarity. It may also be the case that the 1984 sample of 2000 'swamped' the factor analysis process, and precluded the emergence of further diversity of views that were in practice held within the population.

The key factor in determining the strategy may in fact be non-technical: that is, it is a judgement call about the political, public, and to an extent judicial credibility of the alternative options. Given that Q method is not widely known or understood, it may be prudent to err on the conservative side when specifying sample make up and size. This is particularly reinforced when the marginal costs of additional respondents are compared with the opportunity cost of having the survey rejected as evidence at some later date.

The best option may therefore be to adopt a mixed strategy. This would utilise an intercept approach in each of the main geographical centres, in order to obtain a broadly representative sample of the regional community (say a total of 150-200), supplemented with selected sampling of region wide interest groups and minority groups that do not emerge within the intercepts (another 50-100?). The advantage of a geographical spread of sampling intercepts is not only demographic, but also political, in that it provides visibility for the survey in the main constituencies. The sampling of interest groups can also be a useful educational process (e.g. for councillors) and can be offered to interested groups as a way of raising awareness of

the study. This will not "bias" the survey in any way, as the significance or weight attached to factors does not increase once they have stabilised……"

Consequently, Q Sort testing provides a detailed analytical picture of current landscape perception paradigms and the factors that contribute to landscape preferences.

6.2 Application To The Whangarei Landscape Review

To date, this assessment, together with five other Q Sort based assessments undertaken by Lincoln University (for Lincoln University's Agricultural Economic Research Unit; the Foundation For Research, Science & Technology; and the Auckland Regional Council - provide the only substantive understanding of how Zealander's respond to different types of landscape.

As also indicated in Professor Swaffield's explanation of Q Sort, preceding studies (ie. before the 2004 Auckland assessment) show a remarkable degree of consistency in respect of the landscape perception paradigms identified, even allowing for slightly greater variability in the three tourism studies undertaken and the fact that the Rotorua and Kaikoura studies were heavily biased towards visitor - as opposed to local - perceptions of that area. Those studies are as follows:

Understanding Visitors' Experiences In Kaikoura Using Photographs Of Landscapes & Q Sort. Report No. 5. John R Fairweather, Simon R Swaffield, David G Simmons. 1998

Understanding Visitors' And Locals' Experiences Of Rotorua Using Photographs Of Landscapes & Q Sort. Report No. 13. John R Fairweather, Simon R Swaffield, David G Simmons. 2000

Visitors' And Locals' Experiences Of Westland, New Zealand. Report No.23. John Fairweather, Bronwyn Newton, Simon R Swaffield, David G Simmons. 2001

Public Perceptions Of Natural And Modified Landscapes Of The Coromandel Peninsula, New Zealand. Research Report No. 241. John R Fairweather, Simon R Swaffield. October 1999

This pattern has continued with completion and inclusion of the Auckland Regional Landscape Assessment in the body of research undertaken by Lincoln University and associated consultants:

Public Perceptions Of Outstanding Natural Landscapes In The Auckland Region. Research Report No. 273. John R Fairweather, Simon R Swaffield. December 2004.

Thus, on page 47 of the Auckland study (which also addresses the area of closest geographic proximity to Whangarei District) it is concluded that:

> *"The overall distinction between 'wild and cultured' nature ……. Is consistent with the findings of the Coromandel study of natural character (Fairweather and Swaffield, 1999), and with recent studies in Kaikoura, Rotorua and South Westland (Newton et al., 2002)."*

Consequently, these 5 reports provide the only contemporary insight of any kind into New Zealanders' appreciation of this country's landscape resources and in looking to review the 1995 Whangarei District Landscape Assessment, they provide a valid 'home grown' basis for comparison. Further, (as will be discussed more thoroughly in Section 7) the repetitive nature of the core factors identified as underpinning New Zealanders' landscape preferences offer the foundation for a new set of assessment criteria that can be applied in the review process.

While accepting that none of the studies listed are directly relevant to Whangarei District, the range of landscape types covered in all six studies are often comparable with those found within the District, while the patterns of landscape discrimination or evaluation identified have proven to be (as already indicated) remarkably robust and consistent regardless of the geographic location of the individual assessments.

7. Landscape 'Factors' & Review Criteria

7.1 Recent Q Sort Study Findings

The six landscape studies cited - in 'train' from 1998 to the present day - each reach conclusions about the key 'factors' that broadly dictate how New Zealanders, and even overseas tourists, discriminate between higher and lower valued landscapes in a holistic sense. The following is a breakdown of those 'factors' for each study although, for the sake of simplicity, they might equally be described as the paradigms or viewpoints shared by different segments of a community in their reactions to different landscapes. The key characteristics of each paradigm - extracted from the 'findings' and 'conclusions' sections of each report's conclusions - are described, together with key landscape elements, 'themes', characteristics, feelings evoked and negatives associated with each paradigm - described by interviewees as contributing to their landscape preferences. These landscape components / characteristics vary between the studies and only those related to landscape are cited.

The report summaries are set out following the chronological sequence of the assessments, but are also effectively subdivided into three groups - as follows - reflecting slightly different (albeit related) points of focus:

1. **Tourism Analysis - Visitor Perspectives On Local Landscapes & Attractions:**
    - The Kaikoura Study 1998
    - The Rotorua Study 2000
    - The Westland Study 2002
2. **Analysis of What Contributes To naturalness, Natural Character & (By Inference) Landscape** Preferences:
    - The Coromandel Peninsula Study 1999
3. **Landscape Preferences & The Identification Of Outstanding Landscapes:**
    - The Auckland Study 2004

In relation to all but the recent Auckland study, key findings are simply summarized within the relevant tables; however, because the Auckland study and report are of most direct relevance to the Whangarei District Landscape Review, key excerpts from that report's conclusions are also quoted and discussed.

Understanding Visitors' Experiences In Kaikoura Using Photographs Of Landscapes & Q Sort. 1998

Landscape Factor / Paradigm:	***Description Of Its Key Characteristics:***	***Key Landscape Elements Elicited From Study Participants:***
Eco Tourists*	Associates closely with promotional literature about an iconic, natural or semi-natural Kaikoura: mountains, whales, dolphins & seals. The actual town is not part of this 'vision', with most dislike in relation to its commercial areas, race track and South Bay.	***Positives:*** ▪ Views across the sea / bay to mountains ▪ Seals, people and seals ▪ Whales, whale & boat(s) ▪ Sheep, pasture & mountains ▪ Whale watch ▪ Peninsula & coastal views ▪ Sea life ▪ Spectacle, contrast ▪ Restfulness ▪ No housing ▪ Expansive nature / scale of views ***Negatives:*** ▪ Sea food factories near sea shore, ▪ Township & motel strip near the sea ▪ Race track, cafes ▪ South Bay Rd & housing
Coastal Community	Idealise the close links between the town and the sea - a sort of 'maritime arcadia': the small coastal community and its buildings living in harmony with the sea. Also appreciate the town's historical dimension and its relationship with whales - in different ways through different eras. Strong antipathy to the commercial realities of tourism,	***Positives:*** ▪ Whales & dolphins (not seals) ▪ Whale watch centre ▪ Fyffe House & other 'heritage' buildings (even seafood factory), marae & buildings, whalebone arch walkway, museum ▪ Sea & seaweed ▪ Interaction of railway, road & sea, openness of road route & coastal landscape

	cars and traffic - reminders of the crowded conditions 'back home'.	***Negatives:*** ▪ Car parks & seal colony ▪ Motor camp & vehicles Crowded areas, over- commercialization, areas that are too built up ▪ Motel strip & signs near the sea ▪ Cows & pasture ▪ River, bar & sea, across the bay to the sea
Recreational Fishing Retreat	Relate strongly to settings and activities involving pleasure boats, fishing and diving. Antipathy towards signs of commercial tourism and business	***Positives:*** ▪ Fishing boats ▪ Bush clad hills & sea ▪ Looking across the bay & sea to the mountains ▪ The peninsula viewed from South Bay ▪ Peninsula view ▪ Bush down to the sea, rocks, sea, mountains & bush ***Negatives:*** ▪ Commercial areas & motels, seafood factory on coast ▪ Cows & pasture ▪ Interplay of railway, road and sea ▪ Crowding, people, congestion, traffic
Coastal Retreat	Strong focus upon the coastline away from the town, valuing its naturalness, lack of activity, quietness & opportunities for related recreation - essentially walking and sight-seeing. Dislike settings evocative of the commercial exploitation of whales - both historical and contemporary.	***Positives:*** ▪ Bush clad hills & sea ▪ Beach & trees looking towards peninsula ▪ Whale watch & peninsula ▪ Peninsula viewed from South Bay ▪ Pa site ▪ View across the sea & bay to the mountains ▪ Ruggedness, rugged coastline ▪ Peacefulness ▪ Distinctive scenery ▪ Walking ***Negatives:*** ▪ Whale & boat ▪ Motels

		▪ Whale watch centre ▪ Whalebone arch walk Northern strip of development ▪ Air strip area ▪ Too busy & commercial ▪ Over organization, unnatural
NZ Family Holiday	Relate strongly to the classic ingredients of the traditional holiday: beaches, baching and boating. Marked antipathy towards evidence of cultural history, either Maori or European.	***Positives:*** ▪ Views across bay to mountains ▪ Interaction of railway, road & sea ▪ Whales & boats, people & seals ▪ Bush clad hills & sea ***Negatives:*** ▪ 'heritage' buildings, marae & buildings ▪ Cows & pasture ▪ Pa site ▪ Sheep, pasture & mountains, peninsula view

* Paradigms That Are Either Tourist Based Or Have A Substantial Tourist Component

Understanding Visitors' And Locals' Experiences Of Rotorua Using Photographs Of Landscapes & Q Sort. 2000

Landscape Paradigm:	***Description Of Its Key Characteristics:***	***Key Landscape Themes / Elements Elicited From Study Participants:***
Factor 1. (Sublime Nature)*	Strong focus upon nature - the area's terrain, lakes, waterfalls and forests - as a key driver of preference, together with Rotorua's historical associations with geothermal activity. Although responses show a strong preference for natural landscapes, there is little evident appreciation of the distinction between native forests / bush and plantation forests. Strong antipathy to Rotorua's commercial core: too crass, "American" and full of visual pollution.	***Positives:*** ▪ Nature, natural beauty, native, untouched, no people, bush ▪ Solitude, escape, relaxation, quietness, tranquility ▪ Clean water, coolness, trout ▪ Isolation, seclusion, calm ▪ Spectacular, unique, awe inspiring, awesome, powerful ▪ Trees as strength, age , spiritual ▪ Beautiful, attractive ▪ Walking ▪ Geothermal areas & volcanism (Waiotapu) ***Negatives:*** ▪ Commercialisation, cluttered signs, visual pollution, Falsity, contrived, artificial ▪ Not distinctive, nothing, ▪ Bare mountains, unnatural, clear felling, monoculturalism, nothing natural except the sky
Factor 2. (Iconic Tourist)*	Focusing upon traditional Rotorua 'icons': its geothermal activity and Maori culture - strongly correlated with Rotorua's unique sense of place / identity. Often much less responsive to natural beauty and natural settings. Strong antipathy to Rotorua's commercial core.	***Positives:*** ▪ Maori culture, society, food, signing ▪ Natural, naturalness, geothermal, uncontrollable, different, distinct, unpredictable, ▪ Volcanic, fascinating, interesting ▪ Accessibility ▪ 'Mainstream' attractions ***Negatives:*** ▪ Commercialisation, concrete, neon, Americanisation ▪ Common / plain, suburbia, housing ▪ Not distinctive or interesting

Factor 3. (NZ Family)	Relate strongly to family-based activities, preferably within a natural setting: quite wide ranging preferences within this framework - from seeing hot pools to visiting marae. These core activities are complemented by newer attractions, including Skyline Skyrides, the luge, rafting, water sports, etc. Although nature contributes to these experiences, it is the actual activities (in their own right) that are the prime attraction. This paradigm has a strong local resident component.	***Positives:*** ▪ Tranquility, aura, larger than you (expansive scale), peacefulness, mystery ▪ Walking, amid nature, jog, bike, fresh air, triathlon, boating, recreation, white water rafting ▪ Green, peaceful, unspoilt,, attractive,no buildings, appealing scenery ▪ History, symbolism, represents Rotorua, Edwardian style architecture ▪ Comfortable, curious ▪ Natural setting, beautiful rivers & bush, water movement, beauty of nature ***Negatives:*** ▪ Not nice or healthy, diseased, dead, bland, not spectacular, nothing, boring, could be anywhere, usual scenery, no appeal, can't walk through it ▪ Cut over, burnt, logging, barren ▪ Suburban
Factor 4. (Picturesque Landscape)*	Emphasises aesthetic appreciation of variety, contrast and composition, together with irregularity and interesting features in both natural and architectural settings. However, less focus upon Maori culture and geothermal activity as key attractants. Strong antipathy to exotic forestry and clear felling: regarded as unnatural and contrary to perceptions of a clean, green NZ. Strong antipathy to Rotorua's commercial core.	***Positives:*** ▪ Nature, trees, flowing water, beautiful streams, untouched, idyllic, size, escape ▪ Interest, attractive, novelty, different, combination / composition, action ▪ Colour, blue skies, green, white clouds, no clouds, sunshine though trees, hill & trees and buildings fitting together, rural views ▪ Interesting buildings, Victorian mock Tudor, kitsch, colonial ***Negatives:*** ▪ Not fascinating, too simple normal, see everywhere, no culture, from other countries ▪ Trees are dead, cutting & clear felling, destroying nature, bald hills(s) ▪ Mountains not green, meaningless

Factor 5.* (Not Labelled)	Similar in some respects to the 'Iconic Tourist' paradigm (Factor 2) and shares characteristics with other paradigms, but is not coherent or distinctive enough to be readily labeled or stereotyped. Reasonably responsive to the concept of nature as an important landscape asset, although not always showing a high level of preference for it in the Q Sort and also displaying some affinity to cultural scenes often intermixed with Rotorua's geothermal heritage.	***Positives:*** ▪ Experience of forest, natural, peaceful, calm, awesome, water plus forests, green ▪ Powerful, dynamic, moving ▪ Memories, familiarity ▪ Culture, interest ▪ Lake & views, sky, ▪ Spiritual gathering place, heritage ***Negatives:*** ▪ Dull, dead, boring, common man-made

* Paradigms That Are Either Tourist Based Or Have A Substantial Tourist Component

Visitors' And Locals' Experiences Of Westland, New Zealand. 2001

Landscape Paradigm:	*Description Of Its Key Characteristics:*	*Key Landscape Themes / Elicited From Study Participants:*
Pure Nature	Strongly attracted to scenes of pure, untouched nature, favouring unmodified landscapes - mountains, bush, water - that are characterised by features and elements which emphasis the landscape's endemic and pristine qualities. Scenes preferred under this paradigm are virtually devoid of all development and have a high natural content, even if this is essentially visual and/or aesthetic, as opposed to 'real'. Relatively neutral in relation to farming but strongly averse to infrastructure that damages or imposes itself on nature.	***Character:*** ▪ Scenic, beautiful, lushness ▪ Peaceful, restful, remote ▪ Mostly nature, mixture of man-made & nature, man-made structures not obtrusive, subtly done, natural aspect ▪ History, pretty, quaint, rustic ▪ Living in nature, simplicity ***Elements:*** ▪ Lakes & bush, river, beach, water, & bush, native bush, bush clad hills ▪ Native plantings, cabbage trees, flaxes & trees (rimu) ▪ Mountains & paddocks, camping ground, lake ▪ Heritage buildings, old hut ***Evoking:*** ▪ Pure nature ▪ Danger, dark, mysterious, green is relaxing ▪ Feeling of freedom, away from people, time out, relaxation ***Negatives:*** ▪ Man-made industrial, factory, ugly construction ▪ Damaged nature, modified, disrupted, destroyed, intrusive ▪ Exotic plants, rubbish, jet boats, man-made objects, pylons, buildings, tracks
Living In Nature	Correlating with a quite limited group of local men, this paradigm shows an appreciation of both nature and local buildings - the latter strongly symbolic of 'home'. Generally accepting of commercial development associated with local employment, this paradigm also displays a slight attraction to farmed	***Character:*** ▪ Mountains in background, river-bush-mountains, bush-mountains-river-lakes(s), river leading to mountains, contrast in mountains, land 'pops' out of sea near to mountains, mountains to sea, mountains contrasting with flatness ▪ Coast to/and sea, trees and rugged coastline, coastal margins ▪ Natural, wilderness, rugged, good bush

	landscapes / scenes. Generally more discriminating about what is actually natural and endemic than the other two paradigms (above). Very obvious antipathy to infrastructure in general.	▪ Scenic, beautiful, majestic, grand ▪ Nothing man-made, no roads, untouched, open, peaceful ▪ Clean river/water, clean and natural ▪ Symbolic, historic, accessible ***Elements:*** ▪ River(s), bush, mountain, trees, ▪ Beach, coast, coastal scenery, sea, bay ▪ Glacier, snow, geology ▪ Hokitika town clock, old pub, historic hotel ▪ Tourists, hotel, cars ***Evoking:*** ▪ Everything that represents Westland ▪ Typical between Westport 7 Hokitika ▪ Symbolic of Hokitika, ▪ Sport, fishing, winter, retirement, history, comparison with rest of World ***Negatives:*** ▪ Rubbish dump, artificial structures, sewage pond, bits of road ▪ Running the environment, attacking scenery, no effort to fit in, no disguise, no planting ▪ Not looked after, not properly managed ▪ Could be anywhere
Pastoral Nature	Strong appreciation of nature, especially its visual qualities and even the colour green. Related attraction to the idea of living in Westland, with associated attraction to pastoralism and farming, livestock and a country life in which humans are part of nature. As with the Pure Nature paradigm, scenes preferred are virtually devoid of development and have a high natural content, even if this is essentially visual and/or aesthetic, as opposed to 'real'. However, some	***Character:*** ▪ Beautiful, fantastic, majestic, powerful, strong, big, grand ▪ Natural, green, cleanness ▪ Silence, peaceful, quiet, calm, secluded, lots of space ▪ Untouched, stayed the same, bit of old history, bit run down, rustic, ▪ Romantic, cosy ▪ A new composition for me, new things, unique views ▪ Expansive views / overview, looks natural, can see nature at work in it ***Elements:*** ▪ Bush, greenery, trees, grass, green hills, meadow, paddock

	farming scenes are still considered acceptable in this context. Strong aversion to commercial development, infrastructure and any signs of urban development.	▪ Ocean, little bay, water, rivers, creek, snowy mountains, snow ▪ Farm, old yards, old fences, shed, nice house ▪ Cows, cattle, animals grazing ***Evoking:*** ▪ Reminiscent of places traveled to as a child, memories of home & childhood, history ▪ Feeling of connection, nice things, nice place to be, ▪ Similar to Milford Sound, reminds one of dairy farm, reminds one of Mediterranean Coast, encapsulates Westland ***Negatives:*** ▪ Rubbish, dangerous, destroying ▪ Unsightly, ugly ▪ Man-made, non-natural, commercial, contrast - not fitting in, stuck in middle of nature, structure & steel work against natural background ▪ Functionality, necessary but not attractive ▪ Disinterest in new buildings - prefer old, neutral about power plant, neutral about commercial development

* Paradigms That Are Either Tourist Based Or Have A Substantial Tourist Component

Public Perceptions Of Natural And Modified Landscapes Of The Coromandel Peninsula, New Zealand. October 1999

Landscape Paradigm:	*Description Of Its Key Characteristics:*	*Key Landscape Themes / Elements Elicited From Study Participants:*
Factor 1. **(Cultured Nature)**	High levels of naturalness are associated with relatively unmodified landforms, areas of bush, coastal margins, estuaries, beaches, headlands, etc. Notably, those 'loading' on this factor are not very discriminating about differences between what is endemic (eg. native forest) and exotic or introduced (eg. pine forest) with generally neutral reactions to the latter. Greater acceptance of human involvement in the landscape provided that involvement is appropriate: encouraging 'nature' and accepting of human intrusion provided it is "principled" and not intrusive. Thus, areas of open pasture also rate as being 'neutral' However, buildings and urban settings - including the likes of older baches, new housing, wharves and farm sheds - are viewed as severely compromising naturalness. As a result, Factor 1 responses are largely determined on the basis of whether or not a scene is dominated, visually / aesthetically, by elements that display biological functions and processes.	***Positives (More Natural):*** ▪ Coastal, water, coastline, natural beach(es) ▪ Bush / rocks/ sea ▪ Unmodified, least changed ▪ Nothing man-made, no apparent human influence, ▪ Bush, taller and older exotic trees, pasture with trees
Factor 2. **(Wild Nature)**	Also associate high levels of naturalness with relatively unmodified landforms, areas of bush, coastal margins, estuaries, beaches, headlands, etc - in a relatively general, picturesque manner. In addition, those adhering to this factor show more acceptance of immature or semi-mature native regeneration. They also display a high level of discrimination about endemic versus exotic forests - to the extent that pine plantations rate as less natural than most scenes incorporating buildings and urban environments. Although this aversion is exacerbated by signs of clear felling and the straight lines of forest plantings, simple	***Positives (More Natural):*** ▪ Less modified, not built, natural, foreshore ▪ Natural beach(es) ▪ Bush / rocks/ sea ▪ Limited 'sympathetic' modification (but not pines or associations with clear felling)

	awareness of harvesting and related effects (such as erosion) as part of the forestry cycle is enough to adversely influence perception of forestry. Those loading on this factor are more accepting of development within natural settings provided it blends or is in balance with, or is sympathetic to, such settings eg. wooden houses behind pohutukawa on Tairua Head. Contrasting with the Factor 1 respondents, they show a strong aversion to bare pasture and regard it as fundamentally unnatural.	

Of note, those loading on these factors or paradigms cover a very broad spectrum of society, including locals, NZ visitors, tourists, Maori, conservationists and miners. However, foresters load exclusively on Factor 1, while planners tend to lean towards Factor 2.

Although there are very marked differences between both groupings about what does NOT contribute to naturalness, there is actually a remarkable level of agreement about what contributes positively to high levels of naturalness*: "relief, water, tall and apparently unmanaged vegetation, organic (as opposed to geometric or random) patterns, and the absence of man-made structures"* (p. 47) although there are qualifications in relation to the latter point.

Public Perceptions Of Outstanding Natural Landscapes In The Auckland Region. December 2004.

(Note: the landscape assessment types employed in this assessment are shown in Appendix C)

Landscape Paradigm:	***Description Of Its Key Characteristics:***	***Preferences In Relation To Key Landscape Components:***
Wild Nature	Shows a very high correlation with landscapes in which there is little or no evidence of human presence, modification or management. Those landscapes identified as 'truly outstanding' lie closest to the pristine end of the naturalness spectrum. Such landscapes tend to concentrated more strongly among the coastal, estuary / harbour, and lowland / wetland landscape categories assessed. This includes a general correlation between natural wetlands and high levels of preference.	***Outstanding Landscapes -Combined Factors / Paradigms:**** ***Coastal:*** *Undeveloped coastline framed by medium to high relief with cliffs, bush cover, or rough pasture and only very low levels of human modification that are visually subservient to the overall setting.* ***Estuary / Harbour:*** *Open Water, inter-tidal margins and shoreline which is highly natural, backed by low to medium relief with significant areas of tall vegetation, bush and pasture, and only very low levels of human modification that are visually subservient to the overall setting.* ***Lowland / Wetland:*** *Unmodified wetlands with areas of open water and well vegetated margins, and open rolling pastoral landscape with lakes or watercourses, remnant bush and very low densities of settlement.* ***Hill Country / Ranges:*** *Relatively high relief with significant areas of maturing native vegetation interspersed with rough pasture and extensive open views. Landscape structure and vegetation patterns are visually diverse, and clearly express the underlying geology, landform and natural drainage. There is very low density of settlement that is visually highly integrated into the overall setting.*
Cultured Nature	This paradigm exhibits much greater acceptance of slightly modified to modified environments as being outstanding. The presence of humans undertaking recreational activity or other forms of low intensity productive activity remain consistent with a landscape being 'natural' and may complement or even enhance its outstanding values. Those loading on this factor / paradigm are more accepting of mixed bush and pasture on hills, but show an aversion to salt marsh and most forms of wetland - instead generally preferring scenes of lowland pastoralism.	

		Key Elements: ▪ Medium to high relief ▪ Water ▪ Tall vegetation ▪ Beach or rocky shorelines ▪ An absence of human artifacts* ***Key Qualities:*** ▪ Legible & coherent landscape structure & patterns ▪ Variety ▪ Sense of tranquility ▪ Indigenous New Zealand identity ▪ Sense of openness and visual access

(* pp. 45-46 of report)

This study involved some 219 respondents undertaking 229 Q Sorts of four types of landscape: Coastal, Estuarine /Harbour, Lowland / Wetland and Hill Country / Ranges. The percentages of respondents who complied with the two core factor / paradigm profiles identified (Wild Nature & Cultured Nature) ranged from 83% to 97%. Consequently, the vast majority of landscape preferences exhibited by the regional community can be accurately explained by these two paradigms.

The following summary, extracted from pages 47 & 48 of the Auckland report (R. Report No. 273) is important in drawing together the relationships between this assessment and those already summarized, as well as differences between the findings of this study and the 1984 Regional Landscape Assessment, that also explored the general public's landscape preferences - albeit in a somewhat less rigorous, and now historic, manner. The summary also highlights changes in perception correlated with the study's ethnic demographic, that may - in the future - have even more of a bearing on the values attached to different landscapes:

> *The overall distinction between `wild' and `cultured' nature described above is consistent with the findings of the Coromandel study of*

natural character (Fairweather and Swaffield, 1999), and with recent studies in Kaikoura, Rotorua, and South Westland (Newton et al., 2002). These consistencies and similarities add weight to the validity of the findings.

The overall pattern of responses also has some significant similarities with the 1984 Auckland Regional Landscape Study (Brown, 1984), and largely confirms the findings of that study. It indicated that unmodified landscapes with either rocky or beach coastlines, open water, tall vegetation, and some measure of vertical relief were most highly rated, whilst developed, forested and agricultural landscapes were less highly rated. The 1984 study also showed that wetland and salt marsh was relatively poorly rated.

However the 2002 study adds several important dimensions to the 1984 results. First, the 2002 factor analysis has identified several distinctive sets of values. This reveals that whilst some landscapes and landscape attributes are very widely recognised as outstanding by all respondents, there are others which are recognised by some respondents but not by the others. Furthermore, by separating out the different land types into four different Q sorts, the 2002 study has identified public preferences for types of landscape that tend to be squeezed out of the reckoning in a single combined rating. The main examples of this are salt marsh, and mixed pasture and bush on hills, both of which are more widely and more highly rated in the 2002 results than in the 1984 study.

It may be that this finding is partly a result of the greater sensitivity of the 2002 methodology. However, the results of the combined Q sort suggest that there have also been some structural shifts in public preferences. Coastal landscapes, mixed pasture and bush hill country, and lowland wetlands have gone up in relative value compared to the 1984 results. This finding is entirely plausible in the wider policy and socio-economic context. The increased value of coastal landscape is self-evident in the real estate market, reflecting population growth, increased wealth, better cars and willingness to travel. The increase in value of lowland wetlands reflects a growing appreciation of indigenous ecology, and awareness of the increasing rarity of these landscapes, due to drainage and agricultural intensification. The increased value attached to agricultural landscapes with pasture may also reflect the growing demand from urban commuters for rural lifestyle, and the consequential pressure on the more picturesque inland landscapes.

The sample demographics also hint at another dimension of change, which is the influence of the growing ethnic diversity in the regional population. Data on the detailed breakdown of factors by ethnicity for each land type Q sort are shown in Appendix 3. The table shows that the Asian respondents in the sample had a greater tendency to load onto the `cultured nature' factor in the inland land types and for the combined Q sort, and analysis of the interview comments confirms the

value placed by these respondents upon well-managed productive landscapes. This is not a perspective that is limited to Asian respondents, nor do all Asian respondents load onto the `cultured nature' factor, but it is worthy of note. European New Zealanders dominate the wild nature factor 1 in the combined Q sort and their comments emphasise this focus upon pristine environments. It is also notable that whilst Maori, Polynesian and European New Zealand respondents are spread across all factors, there are very few respondents of European ethnicity loading on the `cultured nature' lowlands factor 2 (characterised by open pastoral landscapes). There is also a suggestion of a distinctive Maori/Polynesian coastal factor (Factor 3 noted in the introduction but not analysed in detail), which is focused upon rocky shorelines suitable for food collection. These observations are very tentative, but do suggest that growing ethnic diversity may be part of the change in landscape values, and warrants further research.

7.2 Criteria For The Review Of The 1995 Whangarei District Landscape Assessment

Based solely on the results of the Q Sort studies undertaken elsewhere in New Zealand, and the relative consistency of results in relation to landscape preferences, the following criteria could be employed in the current review and identification of Outstanding and Visual Amenity Landscapes within Whangarei District.

Outstanding & Visual Amenity Landscape Criteria:

Landscape Types:	***Common Characteristics:***	***Specific Physical Elements:***	***Character:***
Coastal	▪ *Naturalness / absence of development* ▪ *'clean & green'* ▪ *Endemic NZ identity* ▪ *Clearly defined patterns & composition (order)* ▪ *Peaceful / tranquil / serene*	▪ *High levels of naturalness* ▪ *No buildings / houses* ▪ *No / few people* ▪ *Beaches backed by landform with medium to high relief* ▪ *Natural / native vegetation cover* ▪ *White sand* ▪ *Dunes & dune grasses* ▪ *Clear & clean water* ▪ *Dynamic water* ▪ *Natural processes / forms*	▪ *Rugged / steep* ▪ *Quiet* ▪ *Distinctive colours & textures (water, landforms, vegetation)* ▪ *Distinctiveness* ▪ *Uninhabited* ▪ *Diverse / varied* ▪ *Integration of housing / buildings into natural setting* ▪ *Sense of accessibility* ▪ *Remoteness* ▪ *Grandeur / spectacle*

Estuarine / Harbours	▪ *Naturalness / absence of development* ▪ *'clean & green'* ▪ *Endemic NZ identity* ▪ *Clearly defined patterns & composition (order)* ▪ *Peaceful / tranquil / serene*	▪ *Indigenous vegetation* ▪ *Natural / native habitats* ▪ *No development / untouched* ▪ *Few people* ▪ *Sandy shores* ▪ *Clear water* ▪ *Abundant vegetation* ▪ *Interplay of water & natural vegetation* ▪ *Combination of vegetation with other elements* ▪ *Complexity of elements* ▪ *Colour contrasts (water & land / water & vegetation)*	▪ *Varied / diverse*
Lowland / Wetland		▪ *Clean, clear water* ▪ *Interaction of water & land* ▪ *Good habitats* ▪ *Rolling terrain* ▪ *Variety of physical elements: eg. wetlands with areas of open water, vegetated margins & pastoral backdrop* ▪ *Native vegetation / forest / trees* ▪ *Obvious hills / landforms: medium to high relief* ▪ *Rolling pastoral landforms* ▪ *Colour & textural contrasts (water & land, bush & pasture)* ▪ *Pasture & animals* ▪ *Natural processes*	▪ *Uncluttered / open / expansive (in appropriate situations)* ▪ *Different colours*
Hill Country / Ranges		▪ *High landform relief* ▪ *Indigenous vegetation / bush* ▪ *Interplay of water & land* ▪ *No human elements* ▪ *Pasture & livestock ('countryside')* ▪ *Forests* ▪ *Treed backdrop to pasture / water*	▪ *Diversity / variety of composition (hills, forest, water)* ▪ *Distinctive* ▪ *Rugged*

7.3 Public Consultation - Whangarei District

To test these findings and provide a local perspective about landscape values, Whangarei District Council has attempted to engage the local public in a 'dialogue' about those

landscapes within the District that are considered to be either Outstanding or having High Amenity value. This has included:

- the running of a 'drop in session' for 65 public interest groups and iwi on the 11th of April at Forum North;
- a second 'drop in session', again focusing upon public interest and community groups at Forum North, on the 19th of May;
- identification of individual landscapes considered by members of the public to be Outstanding or of High Value - employing stick-on dots and NZMS 260 maps of the District - at the annual Whangarei Xpo held on the 16th and 17th of April; and
- use of stick-on dots to indicate preferences on the Coastal, Estuary / Harbour, Hill Country and Lowland / Wetland sets of photos at the Whangarei Xpo.

The following sections summarise the results and ratings derived from those various forms of public consultation.

7.3.1 The April & May Drop-in Sessions

Some 65 public interest and iwi groups were advised of the first 'drop-in' session, including Federated Farmers, Ngati Wai, the Royal Forest & Bird Protection Society, Friends of Whangarei Heads and other community groups. Even so, the turn-out was disappointingly small, with only 10 or so individuals attending the session. Each participant was asked to complete a table that addressed specific landscape consider to be outstanding and the different characteristics associated with such values - as shown overleaf:

WHANGAREI DISTRICT COUNCIL LANDSCAPE ASSESSMENT CONSULTATION

COASTAL AREAS

RESPONDENT: (Council / Group / Govt. Department / NGO / Individual)

Outstanding Landscapes / Natural Features:

Description Of Landscape / Feature:	Location	General Character	Landforms:	Coastal Edge:	Vegetation:	Modification:	Experiential Values:	Heritage Values:
	(Description):	(Description):	*Coastal Cliffs / Escarpment*	*Rocky Shear*	*Intact Native Vegetation*	*No Built Development*	*Drama*	*Registered Archaeological Site(s)*
			Low Escarpment	*Rocky*	*Mixed Native/Exotic*	*Infrastructure*	*Cohesion / Continuity*	*Identified Heritage Site / Area*
			Dunes	*Boulders*	*Exotic Vegetation*	*Individual Houses / Sheds*	*Enclosure - Expansiveness*	*Heritage Patterns Evident*
			Hills / Rolling Land	*Shingle*	*Forestry*	*Scattered Houses*	*Sense Of Place ("NZness")*	*Heritage Associations*
			Lowland	*White Sand*	*Pasture*	*Urban Background*	*Dynamism (Natural Processes)*	
	NZMS 260:		*Expansive Bays Headlands*	*Black Sand*	*Intensive Land Uses*	*Prominent Urban*	*Remoteness / Wildness*	

Following on from both the April drop-in session and the Whangarei Xpo, a second attempt was made to get public interest groups and iwi to participate in the identification of key landscape components associated with high landscape values or preference. Again, the level of participation at the May 19 was unfortunately disappointing, with some 30 individuals attending the workshop, representing just 20 community groups.

However, based on those workshops and the 'worksheet' results of both workshops, the following is a summary of the outstanding landscapes identified by those participants. The Outstanding Landscape locations are listed from north to south and separated into Coastal, Inland and Cultural / Heritage categories:

Outstanding Locations / Landscapes:

Coastal:

- *Te Kopua Island to Bland Bay*
- *Whangaruru*
- *Mimiwhangata*
- *Rimariki island*
- *Whale Bay*
- *Matapouri Bay*
- *Wairoa Stream*
- *Middle Gable / North Gable - Rocky Bay*
- *Tutukaka Coast*
- *Hugh Crawfords Reserve (north Ngunguru)*
- *Ngunguru Spit*
- *Ngunguru River*
- *Kumi Point / Goat Island*
- *Whakareora Mountain*
- *Horahora River*
- *Opouteke River*
- *Pataua*
- *Pataua River*
- *Taiharuru*
- *Kauri Mountain*
- *Ocean Beach*
- *Mt Manaia*
- *Mt Aubrey*
- *Urquharts Bay*
- *Mt Lion*
- *Bream Head*
- *Peach Cove*
- *Smugglers Bay*
- *Limestone Island*
- *Hen & Chicken Islands*
- *Mangapai River*
- *Waipu River*

Inland:

- *Inland Matapouri / Waipipia*
- *Opuawhango*
- *Pakotai Ranges (Te Tarahiorahiri)*
- *Mangakahia River*
- *Apongo Stream / Wetland (Moengawahine)*
- *Papkuri Hewettt Reserve (Moengawahine)*
- *Mangakahia Ranges*
- *Parakiore*
- *Three Mile / Findlayson Stream Bush*
- *Maunu*
- *Mt Maungatapere*
- *Whatatiri Ranges*
- *Tangihua Range*
- *Waipu Caves*

Heritage / Cultural:

- *Glenbervie Stone Walls Area*
- *Town Basin*
- *Tutukaka Marina*
- *Parua Bay Marina*

The following are key landscape characteristics typically associated with high landscape values or preference in the public consultation sessions (ticked or crossed by participants). The following tables list those factors / components that were identified on a relatively consistent basis for each landscape category. However, the limited number of participants in these sessions, together with the fact that some participants filled in multiple whereas others only filled in one, mean that these results are far from conclusive; rather, they are indicative of trends in relation to the public perception and evaluation of different landscapes.

Landforms:

Coastal:	***Estuaries:***	***Hill Country:***	***Lowlands:***
▪ *Coastal cliffs* ▪ *Low escarpment* ▪ *Dunes* ▪ *Hills* ▪ *Bays / Headlands*	▪ *Rolling hills* ▪ *Lowland* ▪ *Open harbour* ▪ *Estuarine* ▪ *River mouth* ▪ *Bays & headlands*	▪ *Ranges* ▪ *Steep hills* ▪ *Strongly rolling*	▪ *Fresh water wetland* ▪ *Plains* ▪ *Low rolling land*

Coastal Edges:

Coastal:	***Estuaries:***	***Hill Country:***	***Lowlands:***
▪ *Rocky Sheer* ▪ *Rocky* ▪ *Boulders* ▪ *Sand* ▪ *Dunes*	▪ *Shingle* ▪ *Sandy* ▪ *Mud flats* ▪ *Rocky*	*N/A*	*N/A*

Vegetation:

Coastal:	***Estuaries:***	***Hill Country:***	***Lowlands:***
▪ *Native Vegetation* ▪ *Mixed native / exotic* ▪ *Pasture*	▪ *Mangroves / native forest* ▪ *Mangroves* ▪ *Pasture*	▪ *Native forest* ▪ *Native remnant pockets* ▪ *Pasture*	▪ *Native forest / wetland* ▪ *Native remnants pockets* ▪ *Native remnant trees* ▪ *Pasture*

Level of Modification:

Coastal:

- *No built development*

Estuaries:

- *No built development*
- *Scattered housing (low density)*

Hill Country:

- *No built development*
- *Scattered housing (low density)*

Lowlands:

- *No built development*
- *Infrastructure*
- *Scattered housing (low density)*

Experiential Values:

Coastal:

- *Drama*
- *Cohesion*
- *Enclosure*
- *Sense of Place*
- *Remoteness*

Estuarine:

- *Cohesion / continuity*
- *Enclosure*
- *Sense of place*
- *Remoteness*

Hill Country:

- *Drama*
- *Cohesion / continuity*
- *Expansiveness (views)*
- *Sense of Place*
- *Dynamism*
- *Remoteness*

Lowlands:

- *Cohesion / continuity*
- *Sense of Place*
- *Remoteness*

Natural & Cultural Heritage Values:

Coastal:

- *Registered site*
- *Heritage area*
- *Heritage patterns*
- *Heritage associations*

Estuaries:

Hill Country:

- *Registered site*
- *Heritage area*
- *Heritage patterns*
- *Heritage associations*

Lowlands:

- *Registered site*
- *Heritage area*
- *Heritage patterns*
- *Heritage associations*

7.3.2 The Whangarei Xpo - Map Identification Of Outstanding Landscapes

A much higher level of public participation and larger range of responses was obtained at the 2005 Whangarei Xpo, with some 178 Outstanding Landscapes identified by members of the public on large scale maps of the District. These were distributed as follows (from north to south) - divided into three broad groupings of *Coastal Landscapes*, *Major Island Landscapes*

and *Inland Landscapes*. The number of respondents identifying each landscape is shown in the central column:

Coastal Landscapes:

Locations:	*No.s:*	*Key Landscape Components:*
Bland Bay Northern Headland / Okoromai Point	*1*	▪ *Peninsula headland landform* ▪ *Enclosed coves on south side; sheer cliffs on northern side* ▪ *Native coastal forest*
South Bland Bay / Motuihi Island / Moanarua Island	*2*	▪ *Enclosed, sweeping bay profile* ▪ *Rocky promontories & islands* ▪ *Enclosed cove* ▪ *Rising hill country* ▪ *Native forest remnants*
Whangaruru North Head Scenic Reserve	*2*	▪ *Peninsula hill landform* ▪ *Sheltered 'inside' coves & local headlands; sheer outer cliffs* ▪ *Native coastal forest*
Oakura Bay	*1*	▪ *Enclosed bay* ▪ *Backdrop ridge* ▪ *Sequence of pohutukawa & coastal forest remnants along ridge* ▪ *Bach settlement*
Oakura Headlands / Okiore Point / Omahu Islets & Bland Rocks	*2*	▪ *Enclosed, sweeping bay profile* ▪ *Rocky promontories & islands* ▪ *Framing headland* ▪ *Rising hill country* ▪ *Native forest remnants*
Mokua Bay	*2*	▪ *Partially enclosed bay / cove* ▪ *Rock shoals and outcrops* ▪ *Rising cliffs at northern end* ▪ *Coastal forest remnants* ▪ *Puatamaroa & Takapurua Paa sites*
Mohei / Helena Bay Headland & Peninsula	*1*	▪ *Peninsula headland landform* ▪ *Rising mantle of coastal hills and bluffs* ▪ *Rock shoals framing coves either side* ▪ *Mataitaua & Pukehune Paa sites*

Locations:	No.s:	Key Landscape Components:
Helena Bay	*1*	▪ *Enclosed bay & shingle / sand beaches* ▪ *Backdrop ridges & rising mantle of foothills* ▪ *Remnant coastal forest remnants* ▪ *Coastal baches / farmhouses*
Motukehua (Nops) Island	*1*	▪ *Rocky Xposed islands & shoals*
Mimiwhangata Bay	*2*	▪ *Enclosed bay & shingle / sand beaches* ▪ *Backdrop ridges & rising mantle of foothills* ▪ *Remnant coastal forest remnants* ▪ *Coastal baches / farmhouses*
Mimiwhangata Headland / Peninsula & Rimariki island	*4*	▪ *Peninsula headland landform & islands framing Mimiwhangata Bay & an expansive Okupe Beach* ▪ *Rising mantle of coastal hills and bluffs* ▪ *Rock shoals & localised headlands framing coves* ▪ *Central wetland / lake*
Okupe Bay	*2*	▪ *Expansive ocean beach* ▪ *Low ridge & peninsula backdrop* ▪ *Sporadic mantle of trees* ▪ *Open pasture*
Roimata Point / Rockells Bay / Four Islets / Moureeses Bay	*2*	▪ *Localised headlands & rock shoals framing small sandy coves* ▪ *Ridges & foothills* ▪ *Coastal forest remnants & stands of pohutukawa* ▪ *Recessive coastal settlement (Moureeses)*
Motutohe Island - Motutara Point Coastline	*7*	▪ *Localised headlands & rock shoals framing small sandy coves* ▪ *Ridges & foothills* ▪ *Coastal forest remnants* ▪ *Open pasture* ▪ *Camping ground & farm houses*
Whananaki Estuary	*2*	▪ *Sinuous river estuary* ▪ *Framing sequence of northern ridges & foothills* ▪ *Coastal forest remnants* ▪ *Lowland terraces*
Whananaki Spit / Beach	*1*	▪ *Distinctive spit landform framing open coastal beach & dunes - more generally flanked by Sandy Bay headlands* ▪ *Low lying primary dunes & mainly native grassland / scrub*

Locations:	No.s:	Key Landscape Components:
Whale Bay / Matapouri Bay Peninsula / headlands	*5*	▪ *Peninsula headland landform closely framing Whale & Matapouri Bays* ▪ *Rising mantle of coastal ridges, hills and bluffs* ▪ *Rock shoals & localised headlands framing sandy, strongly enclosed, coves* ▪ *Extensive remnant coastal forest*
Outer / Southern Matapouri	*2*	▪ *Localised headlands & rock shoals framing small sandy coves* ▪ *Ridges & foothills* ▪ *Coastal forest remnants* ▪ *Open pasture* ▪ *Some pines & other exotic trees*
Tutukaka Harbour / Head - Whau Point	*13*	▪ *Tightly enclosed harbour & rocky coves framed by shoals & local headlands* ▪ *Rising mantle of coastal ridges, hills and bluffs* ▪ *Enclosed, sheltered waters* ▪ *Mantle of remnant coastal forest & scrub* ▪ *Marina* ▪ *Pockets of coastal bach settlement*
Outer Ngunguru River	*4*	▪ *Localised headlands & rock shoals framing small sandy coves* ▪ *Ridges & foothills* ▪ *Coastal native forest* ▪ *Coastal lowland pockets* ▪ *Scattered farm houses / buildings*
Ngunguru Estuary North	*3*	▪ *Sinuous river estuary* ▪ *Framing sequence of northern ridges & foothills* ▪ *Coastal forest* ▪ *Motor camp*
Upper Ngunguru Estuary	*1*	▪ *Sinuous river estuary* ▪ *Framing sequence of close ridges & foothills* ▪ *Extensive coastal forest & scrub* ▪ *Lowland terraces / wetland / mangroves* ▪ *Farm houses / buildings*
Ngunguru Spit	*5*	▪ *Very distinctive spit landform framing open coastal beach & dunes - more generally flanked by the wide arc of Whananaki Bay's headlands* ▪ *Low lying primary dunes & mainly native grassland / scrub*

Locations:	No.s:	Key Landscape Components:
Whakereora Peninsula	*10*	▪ *Peninsula landform leading out to Whananaki Spit: framing the sinuous Horahora & Ngunguru Rivers* ▪ *Small islands & rock shoals at Kumi Point* ▪ *Prominent ridges & foothills* ▪ *Extensive native coastal forest* ▪ *Native wetlands* ▪ *Localised headlands framing small coves & estuarine areas*
Ngunguru Bay	*2*	▪ *Major bay & sequence of headland / bay landscape with the central expanse of Ngunguru Spit prominent* ▪ *Headlands, coves, beaches, shoals & islets* ▪ *Backdrop ridges & foothills* ▪ *Extensive native coastal forest* ▪ *Sinuous estuaries* ▪ *Wetland / terrace margins*
Parauwanui Beach / Pataua North	*2*	▪ *Very expansive, sandy ocean beach Xposed to the Pacific Ocean* ▪ *Line of coastal dunes & dune grasslands*
Pataua Estuary	*2*	▪ *Enclosed, sheltered bay with tidal waters & flats* ▪ *Prominent landmark of Pataua Island & pa site at bay entry* ▪ *Surrounding ridges & rising foothills* ▪ *Patchwork of scrub & some native forest remnants* ▪ *More prominent pasture & exotic trees at the back of Pataua North* ▪ *Two local beach settlements*
Pataua Island	*2*	▪ *Signature headland & pa site framed by both Ngunguru Bay & the waters of Pataua Inlet* ▪ *Sheer cliffs, rock shoals and steep slopes* ▪ *Sporadic pohutukawa & pockets of coastal forest remnants above pasture & rock landforms*
Outer Taiharuru Inlet / Head	*12*	▪ *Sinuous river estuary* ▪ *Framing sequence of headlands, coastal ridges & foothills, with localised bluffs, shoals & coves* ▪ *Quite extensive coastal forest & scrub* ▪ *Areas of pasture* ▪ *Lowland terraces / wetland / mangroves* ▪ *Farm houses / buildings*

Locations:	No.s:	Key Landscape Components:
Upper Taiharuru Estuary	*2*	▪ *Broad tidal estuary & mangrove / alluvial terrace margins flanked by the Taiharuru Peninsula & inland ridges / hills* ▪ *Enclosed, sheltered water body* ▪ *Gentle rolling slopes descending to the estuary's margins* ▪ *Extensive pasture & some coastal forest remnants*
Taiharuru Bay	*1*	▪ *Arc-shaped sandy bay framed by shoals & local headlands* ▪ *Rising mantle of coastal ridges, hills and bluffs on the bay's periphery* ▪ *Pasture & some pockets of remnant coastal forest* ▪ *Coastal bach settlement*
South Awahoa Bay / Kauri Mountain	*2*	▪ *Strong coastal ridge & hill landforms, with steep cliffs & shoals framing a sequence of local headlands & coves / bays* ▪ *Extensive native coastal forest across Kauri Mountain - a local landmark* ▪ *Areas of pasture on hill margins & ridges*
Ocean Beach	*7*	▪ *Very expansive, sandy ocean beach Xposed to the Pacific Ocean* ▪ *Line of extensive, large scale, coastal dunes & dune grasslands* ▪ *Backdrop of coastal ridge & foothill sequence near Kauri Mountain* ▪ *Coastal scrub & wetland vegetation along the rear of the dunes*
Bream Head & Islands	*9*	▪ *Major volcanic landform at the junction between Whangarei Harbour & Ocean Beach - augmented by the Bream Islands: stark contrast of that expansive beach with the ridges, hill & cliffs of Bream Head* ▪ *Rock shoals, islands & localised headlands framing coves & bluffs at the end of Ocean Beach* ▪ *Very extensive native forest & weathered scrub cover (intermixing with pines & pasture near Ocean Beach settlement)* ▪ *Dunes flanking main beach* ▪ *Coastal bach settlement*
Ocean Beach Hinterland	*1*	▪ *Foothills at the base of Mt Taurikura & Bream Head framing southern Ocean Beach* ▪ *Pasture & some scrub / forest remnants on rolling to gently rolling foothills / spurs* ▪ *Inland part of beach settlement*

Locations:	No.s:	Key Landscape Components:
Mt Lion / Home Point / Peach Cove	*6*	▪ *Dramatic & rugged volcanic headland, hills & sheer cliffs framing the entrance to Whangarei Harbour (& contrasting with the Marsden Point / Ruakaka lowlands across the harbour mouth* ▪ *Small bays & coves at Smugglers Bay & Peach Cove* ▪ *Very extensive & intact native coastal forest*
Taurikura	*2*	▪ *Enclosed bay form flanked by the rapidly rising volcanic peak of Mt Taurikura & local headlands / promontories* ▪ *Signature profile of Mt Taurikura* ▪ *Extensive scrub & remnant coastal forest on Taurikura & southern headland* ▪ *Pasture on lower mountain slopes* ▪ *Coastal settlement*
Mt Aubrey / Little Munroe Bay	*4*	▪ *Hill & peninsula landform at the entry to Whangarei Harbour* ▪ *Conical volcanic peak & steep slopes framing localised coves & bays* ▪ *Extensive coastal forest remnants & scrub - intermixed with pasture on lower slopes & across saddle between Mounts Aubrey & Manaia* ▪ *Established coastal settlement*
Mt Manaia	*5*	▪ *Landmark volcanic peak at the back of McLeods & Munro Bays: often steep rolling slopes with an elongated ridge crest* ▪ *Extensive remnant native forests & scrub - intermixing with pasture & settlement margins closer to the coast*
Mt Manaia / Kauri Mountain Saddle	*1*	▪ *Foothills at the base of Mt Manaia & Kauri Mountain framing descending into gently rolling lowland* ▪ *Wide spread pasture & some scrub / forest remnants on rolling to gently rolling foothills / spurs*
Inland Reserve Point / Hill	*1*	▪ *Prominent peninsula framing Munro & Parua Bays merging with coastal hill country* ▪ *Coastal ridge & spurs* ▪ *Extensive remnant coastal forest & scrubland with pastoral margins*
Parua Bay	*1*	▪ *Very enclosed bay framed by Reserve & Manganese Points and Motukiore Island* ▪ *Sheltered tidal water* ▪ *Sequence of coastal ridges & hills* ▪ *Remnant native forest & scrub* ▪ *Pockets of settlement & small scale marina*

Locations:	No.s:	Key Landscape Components:
Parua Bay North	*3*	▪ *Steeply rolling foothills framing the northern reaches of Parua Bay* ▪ *Sequence of ridges, spurs & hill country* ▪ *Extensive remnant coastal forest* ▪ *Pockets of coastal settlement*
Waikaraka Bay	*1*	▪ *Steeply rolling foothills framing Waikaraka Bay* ▪ *Sequence of ridges, spurs & hill country* ▪ *Extensive remnant coastal forest* ▪ *Coastal settlement*
Onerahi Peninsula	*1*	▪ *Prominent harbour landmark* ▪ *Partially vegetated slopes falling steeply towards the harbour* ▪ *Extensive residential development* ▪ *Airport*
Awaroa Creek	*1*	▪ *Tidal estuary with extensive mangrove colonies* ▪ *Sheltered, physically contained, water area* ▪ *Surrounding coastal ridges, spurs & foothills* ▪ *Mixed remnant coastal forest, scrub & exotic plantings* ▪ *Pockets of development on higher ground*
Parihaka Foothills	*1*	▪ *Sequence of coastal ridges, spurs & foothills between Parahaki Hill & Whangarei Harbour* ▪ *Mixed remnant coastal forest, scrub & exotic plantings* ▪ *Strong visual connections with inner harbour & coastal margins* ▪ *Areas of suburban residential development on higher ground*
Inner Whangarei Harbour / Limburners Creek	*1*	▪ *The sinuous upper reaches of Whangarei Harbour lined by mangroves* ▪ *Some vegetated & open space margins* ▪ *Extensive port & city development*
Kioreroa Peninsula	*1*	▪ *Prominent coastal peninsula between Limeburners Creek & Whangarei Harbour* ▪ *Strong coastal ridge landform* ▪ *Scrub & pine vegetation cover* ▪ *Intensively developed (mostly industrial) periphery*

Locations:	No.s:	Key Landscape Components:
Ruakaka Beach / Bream Bay	*8*	▪ *Very expansive ocean beach remotely framed by Bream Head (north) & Bream Tail (south)* ▪ *Dynamic Xposure to the Pacific Ocean* ▪ *Primary backdrop of dunes & dune grasslands* ▪ *Secondary backdrop of scrub, pine woodlots* ▪ *Ruakaka River & Waipua River estuaries / wetlands* ▪ *Salt marsh & mangrove inert-tidal margins*
Waipu Cove / Langs Beach	*5*	▪ *Relatively sheltered beaches & bays framed by headlands, cliffs & rock shoals; enclosed sand beaches & sinuous estuarine / river systems* ▪ *Dune system & dune grassland at Waipu Cove (southern end of Ruakaka Beach)* ▪ *Enclosing coastal ridges & foothills* ▪ *Remnant forest, pohutukawas, scrub & pine woodlots intermixed with some pasture near Waipu Cove* ▪ *Coastal settlements*
Bream Tail	*1*	▪ *Dramatic & rugged headland, hills & sheer cliffs framing the outer reaches of Bream Bay* ▪ *Sequence of local headlands & shoals framing / defining a sequence of small bays & coves south of Langs Beach & Andersons Cove* ▪ *Very extensive & intact native coastal forest with pastoral margins*

Major Island Landscapes:

Marotere Islands (northern Hen & Chicken Islands)	*1*	▪ *Dramatic & rugged island landforms: ridges, sheer cliffs & local headlands framing localised coves & bays* ▪ *Very extensive & intact native coastal forest with pastoral margins* ▪ *Dynamic relationship with Bream Bay & the Pacific Ocean*
Taranga Island (southern 'Hen' of the Hen & Chicken Islands)	*1*	▪ *Dramatic & rugged island landforms: ridges, sheer cliffs & local headlands framing localised coves & bays* ▪ *Very extensive & intact native coastal forest with pastoral margins* ▪ *Dynamic relationship with Bream Bay & the Pacific Ocean*

Inland Landscapes:

Locations:	*No.s:*	*Key Landscape Components:*
Mangakahia Forest	*1*	▪ *Extensive hill ranges: sequence of major hills, ridges, spurs & gullies above the Mangakahia River & Pipiwai Stream valley systems*
		▪ *Very extensive native forest cover & native shrublands merging with peripheral pastoralism & pine forestry*
Southern Glenbervie Forest	*1*	▪ *Extensive hill ranges: sequence of major hills, ridges, spurs & gullies inland of Ngunguru & north-east of Kamo*
		▪ *Very extensive native forest cover & native shrublands next to the extensive pine forestry of northern Glenbervie Forest & pastoralism to the south & west*
Mt Parakiore	*1*	▪ *Prominent 'landmark' hill north-west of Whangarei City*
		▪ *Strong peak landform with ridges & spurs descending from it*
		▪ *Quite extensive & mature remnant native forest interacting with woodlots, shelterbelts & pasture on its margins*
Parihaka Hill / Reserve	*3*	▪ *Prominent 'landmark' hill north-east of Whangarei City*
		▪ *Strong peak landform with ridges & spurs descending from it*
		▪ *Very extensive & mature remnant native forest*
Three Mile Bush Valley	*1*	▪ *Low lying area between the major hill features of Pukenui Forest & Mt Parakiore*
		▪ *Dominant pastoralism interspersed with shelterbelts, exotic trees, scrub & forest remnants near both hill landforms & adjoining streams*
		▪ *Frequent farm house / buildings*
Pukenui Forest	*3*	▪ *Prominent 'landmark' hill-range west of Whangarei City*
		▪ *Strong peak landforms with ridges & spurs descending towards the City & Te Hihi Stream valley*
		▪ *Very extensive & mature remnant native forest*
Te Hihi Valley	*1*	▪ *Stream valley immediately south of Pukenui Forest that directly interacts with that feature's ridges & lower gullies*
		▪ *Rolling to gently rolling valley landfrom strongly enclosed by nearby hills*
		▪ *Remnant native forest descending into native shrubland / scrub & pasture with shelterbelts*
		▪ *Frequent farm houses & buildings / urban fringe*
Mt Houto	*1*	▪ *Distinctive conical peaked hill; part of the complex sequence of hills & valley corridors north of the Wairoa River*
		▪ *Mostly in pasture: some scrub & remnant forest pockets*

Locations:	No.s:	Key Landscape Components:
Tangihua Forest / Hills	*1*	▪ *Extensive hill ranges: sequence of major hills, ridges, spurs & gullies above the Wairoa & Tauraroa River valley systems* ▪ *Very extensive native forest cover & native shrublands merging with peripheral pastoralism*
Manghawai River Countryside	*1*	▪ *Rolling hill & ridge/ valley landforms* ▪ *Remnant stands of bush & scrub mostly following stream corridors* ▪ *Very isolated farm houses / buildings*
Waipu Gorge Forest	*1*	▪ *Steeply incised & sinuous valley corridor: steep slopes, ridges & gully landforms* ▪ *Extensive native forest* ▪ *Scrub, pine forest & pastoral margins*

7.3.3 The Whangarei Xpo - Photo Identification Of Outstanding Landscapes

In addition to the location of outstanding landscapes by mapping with 'dots', members of the public were also asked to nominate outstanding landscape types using sets of photos similar to those employed in the Auckland Regional Landscape Assessment and placing dots on those considered to be outstanding.

The photos do not cover all of the landscape types found within Whangarei District, but are subdivided into groupings that cover **Coastal Areas**, **Estuaries** / **Harbours**, **Hill Country** / **Ranges** and **Lowland** / **Wetlands** (as with the Auckland study). Indeed, because the photos depict 'generic landscapes', as opposed to those that might be well known locally, a number are drawn from the previous Auckland Regional Landscape Assessment. This has accommodated limited cross-referencing of results between both studies, but more importantly serves to help identify those features common to landscapes that are frequently identified as being outstanding. While not pretending to be statistically valid or necessarily representing all cross-sections of Whangarei society, this process complements the other forms of opinion testing already described and helps to build up a more complete picture of community attitudes to landscapes within the District.

The following table indicates that the Coastal, then Estuarine / Harbour landscapes evoked most interest from participants, with some 1007 dots allocated to the Coastal category alone.

In comparison, both the Hill and Lowland / Wetland categories elicited about half that number of responses. The range of landscapes considered to be outstanding covered a broad range, but some distinct preferences are apparent in relation to those landscape rated at the top and bottom of the preference spectrum:

Photo Boards

Photo Number:	***Coastal:***	***Estuary:***	***Lowland:***	***Hills:***
1	*67*	*43*	*16*	*15*
2	*113*	*29*	*84*	*20*
3	*54*	*32*	*20*	*28*
4	*38*	*7*	*14*	*22*
5	*23*	*3*	*3*	*69*
6	*39*	*36*	*24*	*21*
7	*13*	*90*	*59*	*64*
8	*26*	*22*	*23*	*117*
9	*56*	*14*	*30*	*34*
10	*8*	*27*	*30*	*21*
11	*35*	*38*	*7*	*8*
12	*20*	*49*	*22*	*19*
13	*185*	*18*	*131*	*40*
14	*16*	*119*	*11*	*6*
15	*29*	*9*	*17*	*25*
16	*36*	*8*	*12*	*23*
17	*31*	*12*	*29*	*2*
18	*8*	*8*	*23*	*35*
19	*27*	*60*	*-*	*-*
20	*50*	*33*	*-*	*-*
21	*34*	*15*	*-*	*-*
22	*74*	*13*	*-*	*-*
23	*5*	*19*	*-*	*-*
24	*20*	*57*	*-*	*-*
Total Responses:	***1007***	***761***	***555***	***569***

The top 3 photos for each landscape category were

- ***Coastal Photos:*** *13, 2, 22*
- ***Estuary / Harbour Photos:*** *14, 7, 19*
- ***Lowland / Wetland Photos:*** *13, 2, 7*
- ***Hill Country Photos:*** *8, 5, 7*

The following table analyses the top-rating landscapes for all 4 categories so as to identify the key elements & characteristics associated with them:

Landscape Types:	***Specific Physical Elements:***	***Character:***
Coastal	▪ *High levels of naturalness* ▪ *Beaches backed by landform with medium to high relief* ▪ *Natural / native vegetation cover* ▪ *White sand* ▪ *Rock shoals* ▪ *Interplay of cliffs / headlands & enclosed bays* ▪ *Clear & clean water* ▪ *Natural processes / forms* ▪ *No buildings / houses* ▪ *No / few people*	▪ *Strong local identity / sense of place* ▪ *Rugged / steep* ▪ *Quiet / tranquil* ▪ *Distinctive colours & textures (water, landforms, vegetation)* ▪ *Undisturbed / uninhabited* ▪ *Diverse / varied* ▪ *Enclosure/ containment* ▪ *Sense of remoteness* ▪ *Grandeur / spectacle* ▪ *Cohesion / continuity* ▪ *Integrity*
Estuarine / **Harbours**	▪ *Contained water areas* ▪ *Indigenous vegetation (including pongas & salt marsh)* ▪ *Headlands & peninsulas* ▪ *Natural / native habitats* ▪ *Little development / relatively untouched* ▪ *Few people* ▪ *Clean water* ▪ *Abundant vegetation* ▪ *Interplay of vegetation & pasture* ▪ *Interplay of water & land / vegetation* ▪ *Complexity of elements* ▪ *Colour contrasts (water & land / water & vegetation)*	▪ *Enclosure* ▪ *Sheltered (framing of views)* ▪ *Varied / diverse* ▪ *Undisturbed / uninhabited* ▪ *Tranquillity* ▪ *Sense of order / pattern/ structure* ▪ *Sense of remoteness* ▪ *NZ identity* ▪ *Cohesion / continuity* ▪ *Integrity*
Lowland / **Wetland**	▪ *Clean, clear water* ▪ *Contained water bodies* ▪ *Interaction of water & land* ▪ *Habitats (wetland & lowland forest)* ▪ *Natural processes* ▪ *Mature native forest* ▪ *Variety of physical elements: eg. wetlands with areas of open water, vegetated margins & pastoral backdrop* ▪ *Gently rolling pastoral landforms* ▪ *Colour & textural contrasts (water & land, bush & pasture)*	▪ *Strong habitat values* ▪ *NZ identity* ▪ *Varied / diverse* ▪ *Undisturbed / uninhabited* ▪ *Tranquillity* ▪ *Sense of remoteness* ▪ *Distinctive colours & textures (water, landforms, vegetation)* ▪ *Clear pattern / structure to composition* ▪ *Cohesion / continuity* ▪ *Integrity*

Landscape Types:	*Specific Physical Elements:*	*Character:*
Hill Country / Ranges	▪ *High landform relief* ▪ *Indigenous vegetation / bush* ▪ *Interplay of vegetation & pasture* ▪ *Native forest* ▪ *Water & land* ▪ *No human elements* ▪ *Treed backdrop to pasture / water* ▪ *Rolling pasture* ▪ *Interplay of forest & pasture*	▪ *Diversity / variety of composition (hills, forest, water)* ▪ *Distinctive* ▪ *Rugged* ▪ *Layering of elements* ▪ *Clear pattern / structure to composition* ▪ *Habitat values* ▪ *NZ identity* ▪ *Varied / diverse* ▪ *Undisturbed / uninhabited* ▪ *Tranquillity* ▪ *Sense of remoteness* ▪ *Distinctive colours & textures (water, landforms, vegetation)* ▪ *Cohesion / continuity* ▪ *Integrity*

7.4 Findings: The 2005 Review Criteria

Based on the public consultation described and, in particular, the contribution of the district community to the current landscape review at the April Xpo, a number of differences are apparent between the local community's perception of landscape and the findings registered for the Q Sort studies cited, especially that addressing the Auckland Region. Key differences include the reduced importance attached to:

- major ocean beaches;
- dune systems generally - although the comments emerging from the 'drop in sessions' off-set this somewhat; and
- 'black sand' beaches - hardly surprising given the absence of such landscapes / systems within Whangarei District.

As ratings drop towards more average landscapes, a number of one-off, more developed, landscapes also emerge as being 'preferred' or liked in the consultation findings. These include the Tutukaka marina, Parua Bay marina, a village set (rather idyllically) amid hedgerows and trees, as well as a market garden framed by more distance pasture and

native trees. Without a full Q Sort assessment, it is impossible to know the significance of these deviations from the general norm: for instance, the degree to which familiarity with the marina and its associated recreational connotations influence ratings of it, or the extent to which the market garden's distinctive patterning is an important 'driver'.

On the other hand, those living in Whangarei District also display much the same levels of sensitivity (as their contemporaries in the Auckland Region) to coastal and estuarine landscapes containing, or dominated by, native forest, forest remnants, scrub and salt marsh. This confirms key trends and perceptual paradigms highlighted by the Q Sort studies:

- the strong overlap between ecological (natural science) values and landscape values; and
- the related alignment of naturalness or high natural character values with high landscape values.

Indeed, in looking at the public consultation results as whole - the dots on maps and responses to different landscape photos - there is little apparent deviation from the Q Sort findings and trends already cited. Apart from the odd exception (only to be expected with such large scale public participation in the Xpo sessions especially), there is a remarkably high correlation between local attitudes to landscape and the Q Sort paradigms identified by Swaffield and Fairweather. In particular, the Whangarei findings highlight the high value attached to landscapes that are:

- more natural,
- less developed,
- more endemic - with a strong sense of place (Northland and NZ),
- heavily vegetated - usually with native species,
- notable for their habitats,
- notable for high to moderate relief,
- notable for strong patterning and structure,
- contained,
- expansive (related to views / prospect)
- tranquil / remote,
- diverse.

Translating these findings into criteria for the current review of the 1995 district landscape assessment, it is therefore clear that the characteristics cited in Section 7.3 remain central to the identification of Outstanding and Visual Amenity Landscapes. The following 'qualifiers' would appear to be central to differentiation between these two 'levels':

> ***Outstanding*** *ratings will generally be attributed to landscape where both the characteristics and some of the physical elements described are visually dominant or - at least - very prominent and lend the landscape a sense of spectacle and unity. Intrusion from development will typically be minimal or, at least, clearly subservient to the more natural landscape components that characterise such landscapes.*
>
> ***Visual Amenity*** *landscapes are those where both the characteristics and some physical elements described are prominent and /or typical. Such landscapes must have a sense of aesthetic coherence and physical continuity. Although human modification may be readily apparent in such landscapes, it will either contribute beneficially to evident landscape patterns and structure (such as the interplay between pasture and remnant stands of native forest) or will remain a minor overall component of the visible landscape.*

To help provide a clearer understanding of what this means in the context of Whangarei District and to assist with the actual identification of both Outstanding and Visual Amenity Landscapes, the photos shown overleaf and on subsequent pages encapsulate both the landscape elements and patterns / structure commonly associated with landscapes at both levels. Again, these are subdivided into the four categories of: **Coastal Areas**, **Estuaries** / **Harbours**, **Hill Country** / **Ranges** and **Lowland** / **Wetlands:**

Outstanding Landscapes

Visual Amenity Landscapes

coastal landscapes





Outstanding Landscapes

Visual Amenity Landscapes






estuarine / harbour landscapes




Outstanding Landscapes

Visual Amenity Landscapes




lowland / wetland landscapes

Outstanding Landscapes

Visual Amenity Landscapes

hill country / ranges landscapes

8. Related Landscape Issues: Natural Character & Heritage

Natural Character and Heritage values contribute to the wider community perception of 'Landscape' - as defined in the *Pigeon Bay Aquaculture Limited v Canterbury Regional Council* decision by Judge Jackson. Section 6(a) of the Resource Management Act mandates discreet evaluation of Natural Character values and management, even though such values now appear closely aligned with landscape preferences in New Zealand and the importance of naturalness as an indicator of high landscape value. In fact, whereas the assessment of Landscape is still regarded as a matter of largely subjective and holistic interpretation, key criteria have already been employed (and tacitly accepted) as accurate indicators of Natural Character. These are also generally regarded as being relatively more objective (Section 8.1). Regardless of whether or not this is actually the case, it is clear that the confluence of Landscape and Natural Character values is quite accidental, as the identification of such values is substantially reliant on two quite different and discreet assessment processes.

By contrast, shared community values in relation to Historical Heritage [Section 6(f) of the RMA] are much more specific, indeed sometimes unique, in relation to both 'meanings' and individual locations. Consequently, there is no generic or entirely consistent foundation for determining whether a site / area displays high or low heritage value. That may well depend upon whether you are dealing with Tangata Whenua or Pakeha perceptions, and values may well differ at the iwi, hapu or local community level. This clearly differentiates such values from the more all-encompassing perceptual landscape values already described - values that are generally consistent across most of New Zealand society.

Thus, whereas there may be strong overlap between the approaches adopted in relation to assessment of both Landscape and Natural Character, such techniques are likely to be quite different from those applicable to the identification of valued heritage sites and locations. In a similar vein, while the management strategies and tools adopted in relation to the maintenance / protection of Landscape and Natural Character values may also share similarities, they are unlikely to be directly transferable to the conservation of heritage sites and 'landscapes'.

Accordingly, while both Natural Character and Heritage may be regarded as contributing to the perception and experience of Landscape as whole, the assessment of such values needs to be undertaken in a discreet fashion and related management needs to respect that distinctiveness. As a result, Natural Character and Heritage should be regarded as separate 'layers' that ultimately require quite discreet management 'overlays'.

8.1 Natural Character

Whereas considerable effort has historically gone into unraveling the 'mysteries' of landscape and environmental perception, the interpretation of Natural Character values, in terms of section 6(a) of the Resource Management Act, was largely overlooked until the beginning of this decade. Court decisions over what comprises Natural Character have varied and the fact that the Act refers to *Preservation of the Natural Character of the Coastal Environment …..* implies even greater emphasis upon maintaining the environmental status quo than, for example, when addressing *Protection of outstanding natural features and landscapes …….* . At the same time, the extent to which such 'preservation' should apply is complicated by the fact that there is no threshold for such management: it applies simply to the *natural character of the coastal environment* - presumably in general - and not just to 'outstanding' or otherwise defined locations. Essentially, this appears to leave up to individual statutory / territorial authorities to determine what parts of their coastlines should be managed specifically with section 6(a) in mind.

In determining what contributes to natural character, the Environment Court has tended to focus less on areas that have a truly endemic flavour than on areas that are dominated by features and elements derived from nature (ie. that have grown, as opposed to being built by man-kind). As a result, areas of pasture and even exotic forestry have, on occasion been dealt with in similar fashion to areas of native forest.

To try and establish a more stable and consistent foundation for determining Natural Character values, the Ministry for the Environment hosted a workshop on the subject in

February 2002. Held in Wellington, and drawing together a wide cross-section of local and regional planning staff, consultants and educators, the workshop set out to determine a set of 'environmental indicators' appropriate to the assessment of Natural Character. As a result the following indicators were subject to general agreement and have since been employed in a wide variety of locations - from Southland and the Wairerapa coast to the Firth of Thames, Kaipara Harbour and North-eastern Rodney:

- **Abiotic factors** (essentially landform)
- **Vegetation Type** (native / endemic to exotic)
- **Vegetation Cover & Patterns**
- **Land Uses** / **Activities: Buildings & Structures** (their presence / absence)
- **Seascapes & Water Areas**
- **Natural Processes**

In addition, there also be some value in having regard to more experiential values, related to the perception of the likes of 'wildness', ' wilderness' and 'remoteness' derived from Policy 1.1.3 (a) (iii) the NZ Coastal Policy Statement 1994 and its reference to "*the collective characteristics which give the coastal environment its natural character including wild and scenic areas".*

Such criteria are to be generally applied to areas that lie within the visual influence of the sea, lakes, and rivers. For Whangarei District, this most often means either a primary coastal ridge - often clearly defined and relatively easy to employ as a 'cut-off point' - or a more gradual sequence of landforms, including dunes, lowlands, terraces, foothills and slopes, that have a direct visual connection with the Coastal marine Area. In addition, some of Whangarei's key river margins must also be addressed, with the Wairoa River and the margins of its main tributaries a major focus for field assessment.

8.2 Heritage Landscapes

Although Section 6(f) of the Resource management Act makes the "(f) the protection of historic heritage from inappropriate subdivision, use, and development. There are no specific criteria for the identification of heritage landscapes, although common usage of the term "heritage' implies locations, sites, and areas that have meaning because of their historical associations and shared community values related to past events, activities and gatherings / celebrations.

For **tangata whenua**, such sites / areas are likely to relate to: paa, coastal villages and other sites of habitation, areas of food production and storage, middens, burial grounds and sites, transport and portage routes, sites subject to waahi tapu and taonga.

In relation to New Zealand's **post-European heritage** within the District, key sites are likely to include: areas of early settlement, church yards and cemeteries, individual buildings and dwellings, historic structures, and areas associated with pioneer farming. Around Whangarei City especially, the latter tend to be hall-marked by two distinct patterns: stone walls and field boundaries (often linked in with hawthorn hedgerows), and areas of pasture surrounding remnant stands of mature taraire, puriri, kahikatea and totara.

Within the scope of the current review it is not feasible to explore all of these heritage sites / areas in detail. However, in order to provide a more complete understanding of the distribution of locations that have heritage meaning and are likely to contribute to wider landscape values, the following have been identified:

- Known sites of value to both Tangata whenua and Pakeha that arise out of consultation with iwi and other community interest groups.
- Church sites and cemeteries - employing NZMS 260 series maps.
- Early European agricultural areas - based on field mapping of 'stone walls areas' and locations that display the traditional 'islands' of mature remnant forest surrounded by pasture and horticultural blocks.

Bibliography

Arthur, L.M., Daniel, T.C. and Boster, R.S. (1977) ***Scenic Assessment: An Overview***. ***Landscape Planning, 4***.

Bishop, I.D and Hulse, D.W. (1994) ***Prediction Of Scenic Beauty Using Mapped Data And Geographic Information Systems***. ***Landscape and Urban Planning, 30***.

Briggs, D.J. and France, J. (1980) ***Landscape Evaluation: A Comparative Study***. ***Journal of Environmental Management, 10***.

Brush, R.O. (1981) ***Landform And Scenic Preference: A Research Note***. ***Landscape Planning 8***.

Buhyoff, G.J., Miller, P.A., Roach, J.W., Zhou, D. and Fuller, L.G. (1994) ***An AI Methodology for Landscape Visual Assessments***. ***AI Applications, 8***.

Buhyoff, G.J., Miller, P.A., Hull, R.B. and Schlagel, D.H. (1995) ***Another Look At Expert Visual Assessment: Validity And Reliability***. ***AI Applications, 9***.

Craik, K.H. (1972) ***Psychological Factors In Landscape Appraisal***. ***Environment and Behaviour 4***.

Crofts, R.S. (1975) ***The Landscape Component Approach To Landscape Evaluation***. ***Transactions of the Institute of British Geographers, no 66***.

Daniel, T.C. and Vining, J. (1983) ***Methodological Issues in the Assessment of Landscape Quality***. In ***Behaviour and the Natural Environment*** (eds. Altman, I. and Wohwill, J.),Chapter 2, Plenum Press.

Kaplan, R., Kaplan, S. and Brown, T. (1989) ***Environmental Preference: A Comparison Of Four Domains Of Predictors***. ***Environment and Behaviour, 21***.

Land Use Consultants (1971) ***A Planning Classification of Scottish Landscape Resources***, ***Occasional paper no1, Vol 2***, Countryside Commission for Scotland

Orland, B., Weidemann, E., Larsen, L. and Radja, P. (1995) ***Exploring The Relationship Between Visual Complexity And Perceived Beauty***. Imaging Systems Laboratory, Department of Landscape Architecture, University of Illinois at Urbana-Champaign.

Palmer, J.F. (1983) ***Visual Quality and Visual Impact Assessment***. In ***Social Impact Assessment Methods*** (eds. Finsterbusch, K., Llewellyn, L.G. and Wolf, C.P.), Sage Publications.

Patsfall, M.R., Feimer, N.R., Buhyoff, G.J. and Wellman, J.D. (1984) ***The Prediction Of Scenic Beauty From Landscape Content And Composition***. ***Journal of Environmental Psychology, 4***.

Shafer, E.L. And Brush, R.O. (1977) ***How To Measure Preferences For Photographs Of Natural Landscapes***. ***Landscape Planning, 4***.

Shafer, E.L., Hamilton, J.F. And Schmidt, E.A. (1969) ***Natural Landscape Preferences: A Predictive Model***. ***Journal Of Leisure Research, 1***.

Shuttleworth, S. (1980a) ***The Use Of Photographs As An Environmental Presentation Medium In Landscape Studies***. ***Journal Of Environmental Management, 11***.

Simon Swaffield, S & Foster, R. (2000) ***Community Perceptions of Landscape Values In The High Country***, ***D.O.C. Science Report December 2000*.**

Wherrett, J (1996) ***Visualisation Techniques For Landscape Evaluation Literature Review***, Land Use Division, Macauley Land Use Research Institute (Scotland).

APPENDIX A

Landscape Preference & Perception

JoAnna Ruth Wherrett, Land Use Division, Macauley Land Use Research Institute (Scotland), 1996

Introduction

> *"It has been assumed pretty generally that the Greeks and Romans had little attraction for the beauties of rugged nature. On the contrary, it has been argued that the appreciation of the majesty of the mountains and the grandeur of the sea of wholly of modern origin, a development of northern romanticism. Thus a fundamental difference has been assumed to exist between the ancient and modern attitude toward nature" (Hyde, 1915).*

In any given landscape evaluation there will be a mixture of these factors internal and external to the observer. In some circumstances the former may dominate the response, in others the latter may dominate. In other words, in some circumstances beauty will reside more in landscape and in others the eye of the beholder will be more critical in influencing landscape judgements (Dearden, 1987).

Factors In Landscape Preference

There are five general factors of design elements for assessing landscape preference: the characteristics of the observers; the medium selected for presentation; the response format; the relevant environmental attributes of the settings; the nature of the transaction with the specific setting (Hetherington et al, 1993). The first two of these are also mentioned by Tips and Savasdisara (1986) as being the two basic factors of influence: the interviewed subjects and uses their characteristics, such as age, sex, familiarity with landscapes, nationality or occupation; the characteristics and the origin of the rated landscape scenes and the dimensions of the medium used for presentations. These factors are described in the sections on socio-demographic influences and on the medium of presentation.

Need For Public Preference Input To Landscape Evaluations

The sampling of both landscapes and people is equally vital to adequate research in landscape perception; it would be misleading to sample one systematically while ignoring the sampling of the other (Shuttleworth, 1980a). A large number of studies explain preference responses solely as a function of the physical components of natural and man-made landscapes. Many ignore in their analysis the fact that preferences are expressed by people and that people with different backgrounds and experiences probably have unique preferences (Lyons, 1983).

A variety of cultural, social and demographic factors have been shown to be factors in the environmental and aesthetic preferences of the general public (Anderson, 1981; Lyons, 1983). It would also appear possible that landscape appreciation is linked more to perceptions of the subtleties of landscape and the interaction between elements than to the presence or absence of single or readily observable landscape attributes (Penning-Rowsell, 1982).

Professionals in the field of design and environmental planning are seen to have a more sensitive appreciation of landscape quality and are also thought to be able to articulate their feelings more expressively (Dearden, 1981b).Citizen interest is thought by some to be lacking in landscape evaluations because of the inherently subjective and somewhat intangible nature of the problem. However researchers who have used the public in landscape assessments have found them to be highly motivated, interested in the topic and willing to donate their time irrespective of social, economic and educational backgrounds (Dearden, 1981b).

Preference Versus Measurement Techniques

Measurement approaches to visual landscape quality assessment relies on the reduction of the landscape to its constituent components which are allocated points according to the relative contribution of each to landscape quality. Preference approaches make no attempt to single out landscape components or to allocate them points. Instead, it is the total appearance of the tract that is judged. Aside from philosophic arguments against the reductionist approach implicit in measurement methods, preference methods are likely to prove more valid (Dearden, 1981b).

Aesthetic response is defined as preference or like-dislike affect in association with pleasurable feelings and neurophysiological activity elicited by visual encounter with an environment (Ulrich, 1986).

Psychophysical models strive to bridge the gap between the landscape emphasis of the ecological and formal approaches and the observer-emphasis of the psychophysical and phenomenological approaches. They often involve large samples of both landscapes and observers, and try to establish statistical relationships between observer preferences and landscape characteristics. They have proved quite successful in accounting for variance between different landscape traits in terms of landscape characteristics (Dearden, 1987).

There is little danger that one assessment approach will be settled upon to the exclusion of all others. The diversity of assessment methods which continue to emerge will testify to that. If any theory should come to dominate the field it will do so by reflecting and explaining all the various ideas, perceptions, and methods which are possible, rather than by expecting all aesthetic experience to conform to a particular model or rationale (Ribe, 1982).

Paradigms In Landscape Evaluations

A paradigm is defined as (Chambers, 1992): "a basic theory, a conceptual framework within which scientific theories are constructed".

Four general paradigms of landscape perception research are noted by Zube et al (1982). They are the expert, the psychophysical, the cognitive and the experiential paradigms.

Expert Paradigm
Involving evaluation of landscape quality by skilled and trained observers. Wise resource management techniques are assumed to have intrinsic aesthetic effects.

Psychophysical Paradigm
Involving assessment through testing the general public or selected population's evaluations of landscape aesthetic qualities or of specific landscape properties. External landscape properties are assumed to bear a correlational relationship to observer evaluations and behaviour.

Cognitive Paradigm
Involves a search for human meaning associated with landscapes or landscape properties, information is received by the human observer, and in conjunction with past experience, future expectation, and socio-cultural conditioning, lends meaning to landscape.

Experiential Paradigm
Considers landscape values to be based on the experience of the human-landscape interaction, whereby both are shaping and being shaped in the interactive process.

The cognitive paradigm differs from both the expert and psychophysical paradigms in providing a theoretical foundation for landscape perception, by attempting to explain why people prefer different landscapes. It attempts to bridge the gap between subjectivity and objectivity by using a theoretical model from which assumptions can be made and tested using empirical techniques (Kroh and Gimblett, 1992).

The discussion of landscape perception paradigms and disciplines demonstrates a difference between journals having theoretical and applications orientations. Geographic journals tend to emphasise the experiential approach to landscape perception, while the behavioural and recreation journals concentrate on cognitive and psychophysical approaches; the management and applications journals, particularly within forestry and landscape, place heavy emphasis first on expert and subsequently on psychophysical approaches. This might suggest that landscape managers, planners and designers have little interest in theoretical literature, especially in the experiential and cognitive paradigms, and particularly if it is lacking in suggestions of practical use (Zube et al, 1982).

Evolutionary Concepts

Man's origins necessitated that he became a highly visual animal, and that an ability to handle large quantities of visual landscape information has been essential for our species' long term survival (Ulrich, 1977). Evolutionary history has left its mark on contemporary humans in the form of strong biases concerning perception and preference. People should prefer landscape scenes having qualities which aid in making sense of the information present (Ulrich, 1977).

If a given scene has attributes which facilitate its comprehension, then a creature who likes to acquire large amounts of knowledge should favour the scene. To be preferred, therefore, a scene should not only present information, but it should also be identifiable and easily grasped. A scene that is ambiguous and resists identification, or which places very high processing demands on the observer, should be less preferred.

Socio-Demographic Factors In Landscape Perception

Many different social and demographic factors have been shown to influence the perception of landscape. Age and familiarity are noted a being of high influence and are discussed later. Land Use Consultants (1971) noted the following association and factors as influential to the perception of landscape: an awareness of historical/cultural associations; well known names; home environment, cultural environment; education; experience of other landscapes; knowledge of landscape; familiarity of landscape; role (e.g. on holiday); position relative to landscape; and immediate state of mind.

Previous Experience Of Landscapes
Previous experience of landscapes has a "profound influence" on human perception and preference, according to Balling and Falk (1982), who state that landscape preference is undoubtedly not simply a function of some innate preference. Purcell (1992) comments that

humans experience each new or previously encountered landscape within the context of mental models of previous landscape experience.

Gender
Gender is a trait which reflects the amount and nature of societal learning, which may affect landscape preference. It is also an important social differentiator of people's attitudes toward the natural world (Lyons, 1983). Indeed, Hull and Stewart (1995) showed that men and women look at different objects while walking, with men more likely to be viewing the ground, topography and ephemeral objects.

Education
Another important social differentiator is education (Lyons, 1983) - in a study by Balling and Falk (1982) college students had more favourable attitudes towards wilderness than secondary school students. Education can also be linked to the perception of crowding in a recreational landscape. Glyptis (1991) found that higher educated people were less tolerant of crowding than those with less education. However, this was not found in a study based on a loch and forest landscape (Wherrett, 1994) where higher educated people were more likely to accept a higher level or crowding.

Environmental Awareness
It has been suggested that there is an environmentally aware public and an environmentally unaware public, who possess quite different perceptions (Dearden, 1981b). The former are often members of environmental organisations, a factor which has been shown to indicate a variation in attitude towards natural landscapes (Harvey, 1995).

Cross Cultural Differences
Zube and Pitt (1981) looked at cross-cultural differences. They found that many native and non-native groups showed preferences for landscapes similar to their home environments. The differences between native and non-native groups was larger than that between American and British subject groups. However, it would appear that the similarities across cultures in terms of perception and cognition are much more impressive than the differences (Ulrich, 1977).

Theory Behind The Influence Of Socio-Demographic Characteristics

There is now considerable evidence that a domain of knowledge such as that associated with landscapes or more generally outdoor scenes is represented in memory by mental structures (referred to as knowledge structures) containing two types of knowledge. The first is based on the overlap in the attributes of or the family resemblances between all the previously experienced instances of that domain of knowledge. The second type of knowledge organises memory for large numbers of individual instances, that is memories about experience of particular instances and events. Generic knowledge structures contain default values for relevant attributes and relationships (Purcell, 1992).

At the perceptual level, a landscape might be represented in terms of colours, shapes and textures at a number of scales; at more abstract levels information about topography, naturalness or degree of man-induced change could be represented, while at the most abstract level meanings associated with the word landscape or the types of activities that could occur in landscapes would be represented (Purcell, 1992).

Results show that when asked to make a judgement of the typicality of a landscape, respondents use a relatively abstract set of attributes which can result in similar ranges of typicality being found independent of the geographic location of the landscapes being assessed (Purcell, 1992).

Familiarity

Knowledge and familiarity of a landscape are noted as factors affecting perceptions of landscapes (Land Use Consultants, 1971). If familiarity with landscape influences perception, and if there are clear cut regional differences, then generic landscape models may not be viable (Wellman and Buhyoff, 1980). Several studies have looked at this factor (e.g. Lyons, 1983; Wellman and Buhyoff, 1983) with differing results.

The study of Wellman and Buhyoff (1980) showed that the subjects did not demonstrate greater visual preference for a particular regional landscape even if they were informed beforehand of the geographic differences. Also, the subjects from widely different geographic regions evaluated the landscapes, in terms of preference, in essentially the same manner, suggesting that regional familiarity may not be a serious problem for landscape preference researchers (Wellman and Buhyoff, 1980).

On the other hand, the study of Lyons (1983) which examined preferences of college students from different regional biomes, showed that preferences were highest for the most familiar biome. The subjects from coniferous forest areas showed a significantly higher preference for living in non-tropical, forested landscapes than did the desert dwellers. These findings support the hypothesis that a person's landscape preference is strongly influenced by his or her residential experience in different biomes (Lyons, 1983).

As an example, Balling and Falk (1982) showed that foresters, who were the most familiar of their study groups with a range of natural environments, showed the highest preference among the adult groups for each of the biomes.

The risk and uncertainty connotations of some natural settings are important ingredients of natural landscape preferences. Moreover the `alarming, deterring' or `stimulating, exciting character of certain landscape features depends in personal capacity for accepting risk or challenge (Bernaldez et al, 1987).

Age

Age-related differences in landscape preference can be seen in the studies of Lyons (1983), Bernaldez et al (1987) and Balling and Falk (1982). Balling and Falk (1982) found significant age related changes in the preference for landscapes that differ in terms of floristic organisation and that underlying preference can be modified by experiences across the life span.

In the study of Lyons (1983) preference scores for vegetational biomes decreased for young children, then stabilised or rose for college-aged and adult subjects, dropping again for elderly subjects. The coefficient of variation around the age group mean tended to decrease with age; young children as a group were more enthusiastic and less consistent in assessing landscapes than were older subjects (Lyons, 1983). The differences in preference could have resulted from the way that different ages used the rating scale.

Multi-variate analysis of the preference responses of children to landscape photographs allowed the identification of three independent preference dimensions: the 1st and 3rd dimensions (illuminated vs shadowed; rough, harsh us bland, smooth texture or relief) were considered as forms of a more general risk/uncertainty factor often influencing landscape preference. Younger children (11 years old) showed less preference for both shadowed, less illuminated scenes (1st dimension) and harsh, rough scenes with aggressive forms (3rd dimension) than older children (16 years old). There were no significant differences for the 2nd dimension (landscape diversity) (Bernaldez et al, 1987).

Consensus

Landscape preference studies should not rely exclusively on general rankings of preference, but should also consider other trends of variation and eventually compare individual patterns of selection. If only consensus aspects are examined (e.g. group preference rank), idiosyncratic features remain ignored. The partition of the total variation between consensus scales and other trends of variation will probably depend on the degree of socio-cultural homogeneity of the group of respondents (Abello et al, 1986).

The subjects' variance in the relative evaluation of appraisal characteristics may have very different origins. It may be related to socio-cultural or psychological factors that affect landscape preference as described by a number of authors (Abello et al, 1986).

To evaluate levels of consensus the `modal percentage' is determined, being the proportion of respondents giving the modal evaluative rating (Penning-Rowsell, 1982).

Reasons for the real variation in consensus levels remain elusive. Evidence suggests little overall correlation between perceived attractiveness and consensus levels, although the more `extreme' evaluations rarely attract majority support. Consensus does not increase with greater familiarity. Indeed those admitting less knowledge of local landscapes show greater consensus in their generally cautious and conservative evaluations. Those with the greatest landscape knowledge are more critical of its various qualities so that their responses show greater variance. The degree of consensus on evaluation therefore generally declines with increasing landscape familiarity, although not always sufficiently to be statistically significant given the available sample sizes (Penning-Rowsell, 1982).

The Ability Of Landscape Architects To Predict Public Preference

The purpose of the research was to ascertain whether landscape architects could determine the rank order of a series of landscapes as they were preferred by another group of subjects, based on knowledge of what this group had said they liked and did not like about the landscapes (Buhyoff et al, 1978).

The results showed that a group of landscape architects, given general information as to what a sample of people like and don't like about a set of photographs, can come quite close to reproducing the client group's rank orderings of those photographs (Buhyoff et al, 1978). Planners may be able to assess people's preferences by asking them what they do and do not like about landscapes, but they cannot and should not rely on their own preferences in planning for people (Buhyoff et al, 1978). It is desirable for planners to make some assessment of people's expectations and preferences rather than relying on their own judgement (Buhyoff et al, 1978).

Medium Of Presentation

A prevalent though unstated assumption throughout much of the empirical research in environmental preference is that the more closely experimental conditions represent `real-life' experiences, the more accurately the results will reflect `real-life' responses to the studied environment (Hetherington et al, 1993). However, there is the question of whether people do respond the same to a real landscape as to a simulation (Kroh and Gimblett, 1992).

Photographs As Landscape Surrogates

The use of pictures as surrogates for real landscape has often raised objections in the sense that photographs are less complex, less multi-dimensional, and offer less interaction than do real scenes (Abello et al, 1986). Pocock (1982) states that however good the simulated landscape may be, "it does not obscure the fact that a photograph is totally unable to convey the life of the scene: unable to discriminate: it merely records everything at one instant".

The use of photographs in recent work concerned with environmental aesthetics, perception and preferences has been commonplace, because photographs can be used with greater economy, speed and control than can real-world situations. This approach follows the long tradition in psychological studies and experimental aesthetics of using stimulus substitutes (Shuttleworth, 1980a). However, photographs are useful in landscape management decisions only if respondents rank pictures in approximately the same order as they rank the actual scenes (Shafer and Brush, 1977). A number of researchers have reported high correlations between photo-based judgements and on-site judgements of scenic beauty (Hetherington et al, 1993). Shafer and Brush (1977) found that respondents reacted essentially the same way to both the scene and the photograph.

Perceptual Distortions
It must be remembered that when a surrogate environmental display such as a photograph is used, perceptual distortions can and do occur. The most obvious source of variation between photographs of a view and the view as seen on the ground is caused simply by the fact that the two may differ in content. The eye takes in a much larger field of vision than the camera, having a very wide lateral cone of vision. This deficiency can be overcome with the use of panoramic photographs (Shuttleworth, 1980a) which are now far less costly than they were some 15 years ago.

There is a need to provide constancy scaling and perspective resolution aids in photographs if they are to allow the viewer to perceive accurately objects as the same solid visual shapes, with their characteristic properties of colour, shape and distance, as perceived in the original (Shuttleworth, 1980a).

A fundamental source of perceptual distortion lies in the differing physical nature of views and photographs. The view consists of three-dimensional objects, stationary or moving, at various distances in space, whereas the photograph is merely a two-dimensional image of that reality obtained by the projection of the view through a more or less complex optical system. It must be remembered that retinal images, although the result of "seeing" as commonly understood, occur merely as one link in the chain of events which constitutes the process of seeing (Shuttleworth, 1980a).

Validity Of Photographic Simulation
Several authors have tested the validity of using photographs as simulations of real landscapes. Thayer et al (1976) tested the model of Shafer et al (1969) and found it to be a valid predictor of perceived landscape beauty in photographs; Stamps (1990) conducted a meta-analysis of papers discussing preferences obtained in situ and preferences obtained through photographs, resulting in a combined correlation of 0.86; the conclusion reached by Dunn (1976) was that photographs may be used to accurately represent landscapes.

However, not all authors agree with this result. Kroh and Gimblett (1992) found that people do not respond similarly to an on-site landscape experience and a simulation and that classifications drawn from field experience differ from laboratory ones because of the impact of multi-sensory stimuli. The utility of the validity research is limited to the static environment, because the represented landscapes did not contain any prominently dynamic elements (Hetherington et al, 1993) and thus the preference measured is that of the static landscape (Kroh and Gimblett, 1992). It has been concluded that the static surrogate (colour slides) do

not sufficiently preserve dynamic environmental features, while the dynamic surrogate (video) produces flow-related differences in ratings of scenic beauty.

Shuttleworth (1980a) looked at eight investigations of the validity of photographic surrogates. All the studies provide evidence that scenic quality evaluations based on photographs are similar to ratings made by different observers in the field, and provide some tentative evidence that not only overall responses but also the details of those responses are similar. The simulations were found to be more limited when used with a feature checklist for assessing the effect of specific landscape features on scenic quality. They concluded that photographic simulation proved most reliable in dealing with the overall perception of the landscape, but less reliable when dealing with perception of detail elements and characteristics in the landscape (Shuttleworth, 1980a).

Panoramic Verses Regular Prints - Framing
Although the retinal image is the physiological basis for seeing, it is not the image experienced by the viewer. Therefore, despite the intrinsic similarity of photographs to retinal images, photographic simulations should not be attempts to mimic "peculiarities of the retinal image" (Nassauer, 1983; Shuttleworth, 1980a).

People may frame selected views in field experience just as a photographer does in shooting a photograph. That a photographer would select the same frame, or isolate the same landscape elements, as every other viewer of a given landscape seems unlikely (Nassauer, 1983).When a great deal of the landscape is included in the photographic frame, the viewer may scan the photograph much as she/he might scan the landscape, selecting from a range of stimuli those that are important. Narrower, more select frames may enhance the distancing effect of photographs (Nassauer, 1983). The elements included in the photograph will be limited by the horizontal range of the view, and by the frame selected by the photographer.

Analysis of the data suggests that, under some conditions, panoramic slide sets elicit responses different from responses to wide-angle slides (Nassauer, 1983). In the study of Nassauer (1983) panoramic slide sets received significantly higher ratings than wide-angle slides for scenic landscapes displaying dominant horizontal landscape form. This framing effect is apparently operational only in scenic landscapes. In non-scenic landscapes, viewer reaction to compositional factors like framing may be relatively less important than reaction to landscape content (Nassauer, 1983).

Results Of Experiments Into Photographic Surrogates Of Landscapes

Experiment of Shuttleworth 1980a
The results of this experiment showed that there were no differences between the verbal response patterns and the overall evaluations of scenic quality of randomly chosen subgroups of respondents viewing the scenes in the field. The results indicated that there were very few differences of significance between the reactions to and perceptions of the landscapes either when viewed in the field or as photographs. The results also suggest that black and white photographs tended to induce more extreme and more highly differentiated responses than colour photographs, and that the latter related more closely to field responses (Shuttleworth, 1980a).

Experiment of Kroh and Gimblett 1992
While a preference for actual versus simulated experience is evident, the rank order of scenes showed little correlation between site and laboratory. The laboratory test data exhibited a much lower level of content words and a higher measure of diversity than the field data. The limited use of content words indicates that landscape simulations were less evocative of sensory awareness. The higher levels of diversity indicate that, while sensory stimuli were limited, it was more difficult for respondents to form consensus on each scene (Kroh and Gimblett,

1992). The content analysis of on-site data exhibits a richer vocabulary more expressive of a simulating experience. Although more content words were found, the measure of diversity was lower than for the laboratory and relatively consistent for all scenes (Kroh and Gimblett, 1992).

Experiment of Stamps 1992
Stamps (1992) tried to find out if people could distinguish alterations from reality in photographs. In the study only 14% of the responses were correct identifications of photographic alteration. It was found that the effects of simulation on judgements of environmental preference are in the order of 5 to 10% of preference variance (Stamps, 1993).

Best Method Of Photographic Simulation

The landscapes must be depicted by colour photographs, to maintain a potentially important source of landscape variety in the study (Shuttleworth, 1980a) - colour clearly gives the viewer more information about the landscape than a black and white image (Nassauer, 1983).

Different photographic framing choices can elicit different viewer responses to a landscape. Framing formats that create large images with broad horizontal ranges may be superior for simulating field experience. Panoramic slide sets can achieve this effect (Nassauer, 1983). Shuttleworth (1980a) stated that the landscapes must be depicted by wide-angle photographs to provide the lateral and foreground context in each of the views without apparent distortion of the actual scale relationships that are found in the direct perception of landscapes. It is suggested by Nassauer (1983) that conventions should be developed for making framing decisions.

Abstraction Of Computer Generated Images

Researchers have represented outdoor scenes with a spectrum of computer graphical techniques including: simple perspective line drawings, perspective block diagrams in which a grid of distorted squares gives the perception of terrain, highly realistic representations which account for shadows, texture of grass and forests and the effects of haze and clouds on visibility (Killeen and Buhyoff, 1983).

Significant but moderately strong association was found between the artist's sketches and both the original slides and the computer-drawn lines. No statistically significant association exists between the slides and the computer-generated drawings (Killeen and Buhyoff, 1983).

The level of abstraction can significantly alter the views on ranking a set of abstract representations of landscapes. Therefore, when using modern tools, such as computer plotter drawings to facilitate the study of particular factors influencing landscape preference, such as topography, presence of vegetation, human influences etc. care should be taken to abstract from reality along dimensions that do not interact strongly with the factor studied (Tips and Savasdisara, 1986). Abstraction is not inherently bad, but achieving less abstract mappings is desirable, because it is likely to yield more universally understandable visualisations (Bishop and Karadagli, 1996).

It has been demonstrated that there are differences in the perceptual effectiveness of computer simulations among different types of computer generated images. Image processing elicited the most similar responses to real images. Wire frames, the most abstracted images, yielded the most different responses. Surface model and COMB images showed a modest similarity to real images, although they were somewhat abstracted (Oh, 1994).

Wire frame simulations have a lack of colour and detail. Surface model simulations can be `artificial and cartoonish' and have insufficient detail for sky, vegetation and landscape

structures. Combinations of surface model images and scanned photo images (COMB) also have insufficient detail. Image processing simulations, however, give a very credible simulation (Oh, 1994). In fact only image processing among the four methods was successful in separating the visual attractiveness of one landscape from another in simulations (Oh, 1994).

Other Visual And Non-Visual Effects

Landscape perceptual preference involves much more than a visual evaluation of a static scene. Human preference for landscape is directly linked to the nature of people as multi-sensory beings. The verbal descriptions given by respondents in this research indicate that tactile, dynamic features significantly contribute to preference (Kroh and Gimblett, 1992). Although the evaluation may be based primarily on the visual aspects of the setting, other aspects, such as sound and smell also contribute to landscape perception (Balling and Falk, 1982). The effects that are looked at here include labelling of the landscapes, sound and motion, looking time (relating to viewing slides), complexity, mystery and prospect and refuge. Some of these factors cannot be used in a surrogate landscape study, in particular sound and motion require different media of presentation than the standard photograph or slide.

Non-Visual Effects

Labels In The Landscape

The influence on aesthetic values of the names of land areas has been explored by Anderson (1981). The results of analysis of variance on the Scenic Beauty Estimation (as described in Schroeder and Daniel, 1981) or SBE scores for each slide demonstrate that scenic quality judgements were affected by the land use designations, as well as by the appearance of the slides. The wilderness area and national park labels consistently elevated evaluations of landscape quality, while the leased grazing range and commercial timber stand labels consistently reduced observers' judgements of attractiveness (Anderson, 1981).

These results may imply that for relatively high scenic quality landscapes, an enhancing label can improve aesthetic value, while a detracting label will have only a slight effect of an attractive scene but a much stronger negative effect on a relatively ugly landscape (Anderson, 1981).

One explanation for this is that the labels induce expectations of different levels of scenic quality in the landscape. When the appearance of the landscape confirms these expectations, the effect of the names is more pronounced than when the actual scene is not congruent with the expectation (Anderson, 1981). Implied naturalness and economic connotations resulting from the labels also affect scenic quality rankings.

Sound And Motion

Acoustic impacts on aesthetic evaluations of different settings have been addressed in only a handful of studies. This lack of research may reflect a consensus among researchers that visual features of a setting are paramount in determining aesthetic response to it (Anderson et al, 1983).

Sound and the interaction of sound and site is highly significant in explaining variance in a study by Anderson et al (1983). They found that there is an interaction between acoustic and other features of a setting that modifies the effect of different sounds in determining the quality of the setting. Sounds that, in the abstract might be regarded as enhancing improved wooded, natural, and heavily vegetated urban settings, but not built up sites such as city centres (Anderson et al, 1983).

The results of Hetherington et al (1993) indicate that both sound and motion influence judgements of scenic beauty. Motion without sound produces similar results to the static digitised image condition, while the motion with sound and the original video results suggested a consistent polynomial relationship between perceived scenic beauty and flow. The static surrogate (slides or photographs) does not sufficiently preserve dynamic environmental features, while the dynamic surrogate (video) preserves flow related differences in ratings of scenic beauty (Hetherington et al, 1993).

Looking Time - A Null Indicator
It was hypothesised that differences would be found in preferences for landscapes in direct proportion to the time spent looking at visual representation of those landscapes (Wade, 1982). However, the linear relationship between average looking time and the average preference rank showed that as preference for landscapes used increases, time spent looking at them tends to decrease. Through talking with some of the subjects, the investigator learned that the subjects looked at some of the slides longer because they were more interested in or curious about the landscape than in actually showing a preference for it as a scenic vista. A few subjects, nevertheless, ranked them fairly high because of the contrast they presented in colour and texture. Some slides were ranked low because the landscapes had too much open area (Wade, 1982). The main conclusion from the study was that there is no relationship between looking time and preference rank.

Visual Effects

Complexity
It has been found that individuals tend to prefer complex natural landscapes over less complex ones; complexity has been shown to be an important predictor in landscape preference evaluation. The hypothesis that individuals generally prefer natural environments of high complexity is supported by the results of Shutte and Malouff (1986). Orland et al (1995) used a computer model in an attempt to simulate human preference based on complexity and scenic beauty.

Computer measures of complexity included colour, edges, fractal dimension, standard deviation, entropy, Huffman encoding and run-length encoding. These six measures constituted the computer complexity measure, this was used to look at preferences for pine forest images. In the preference results old growth forest received the highest ratings for beauty and complexity and the new growth forest received the lowest. This contradicts the computer measures, which showed that the new forest images contained the highest degree of complexity and the old growth forest the least (Orland et al, 1995),

While the computer measures appear to be valid in measuring what they purport to measure, it is unsure what ought to be measured to capture the visual differences that trigger human subjective responses. It is disturbing that while perceived complexity seems so consistently related to perceived beauty, the measure bears no relationship to the image-based physical measurement. It is possible that in the absence of a commonly used conception of scenic complexity the human respondents are simply doing what they are used to - rating their underlying preference for the scene (Orland et al, 1995).

Complexity affects not only the amount of information in a landscape scene, but also the time and effort required to process the display. Results have consistently indicated that preference and complexity are related in a hyperbolic manner. High preference is associated with a moderate level of complexity, while low preference tends to be linked with the extremes of either low or high complexity (Ulrich, 1977). However, research has shown that human perception is characterised by a bias favouring patterned information; under certain conditions, high complexity displays can evoke high preference (Ulrich, 1977).

Mystery
Mystery is defined as the "degree to which you can gain more information by proceeding further into the scene" (Lynch and Gimblett, 1992). Mystery has been found to be a consistently perceived attribute of landscapes. The following structural relationships have been found to be important (Lynch and Gimblett, 1992):

- *perception of mystery decreases with perceived distance;*
- *the perception of mystery declines as perceived screening declines;*

- *as perceived spatial definition increases, the perception of mystery increases;*
- *perceived physical access increases the perception of mystery.*

While mystery alone does not have total influence in the overall preference for landscape, it has been shown to be a major contributor (Lynch and Gimblett, 1992). Mystery contributes some ambiguity and uncertainty to visual displays; therefore, certain instances of high mystery should have a negative effect on aesthetic preference (Ulrich, 1977).

The compositional qualities of landscape relevant to mystery include: distance from forest stands; edge diversity; and absorptive or reflective qualities such as those inherent in water features. Four landscape variables of mystery are spatial definition, physical accessibility, distance of view and partial screening (Lynch and Gimblett, 1992). These are defined as follows:

> *Partial screening is defined as the degree to which views of the larger landscape are visually obstructed or obscured;*
>
> *Distance of view is measured from the viewer to the nearest forest stand;*
>
> *Spatial definition is the degree to which landscape elements surround the observer;*
>
> *Physical accessibility is defined by an apparent means of moving through or into the landscape as a result of fine textured surfaces in the foreground plane.*

<u>Focality, Ground Texture And Depth</u>
Focality refers to the degree to which a scene contains a focal point, or area that attracts the viewer's attention. Focality is produced when lines, textures, landform contours, and other patterns direct the viewer's attention to a specific part of the scene (Ulrich, 1977).

Irregular textures present the viewer with unordered high complexity. Such displays should evoke low preference responses because they resist rapid and efficient comprehension. Surfaces that have even textures, or areas of textural homogeneity, should be accorded higher preference since the complexity is ordered (Ulrich, 1977).

Ground textural gradient is important in distance perception. A uniform, even texture preserves the sense of "continuous" ground surface which is necessary if distance is to be accurately perceived. Rough, irregular textures may disrupt a sense of continuous ground surface, thereby resulting in spatial ambiguities, lower legibility, and reduced preference (Ulrich, 1977).

If depth could not be perceived, landscape features would stand ambiguously in two dimensions; depth is linked to legibility through its effects on the scale of landscape elements (Ulrich, 1977).

<u>Prospect And Refuge</u>
Prospect and refuge is concerned with the openness or enclosure of views and observation points. A study by Nasar et al (1983) examined this effect in terms of the effects on male and female subjects. Subjects rated the more open views as safer than the enclosed ones, with females assessing the safety lower than males. The preference score for females was higher from the protected location than the unprotected one, while the opposite was true for males (Nasar et al, 1983).

The observer's context (in this case location and sex) seemed to influence emotional response. The open view was judged as safer than the closed one, and this effect was more pronounced from an open observation point than from a protected one. This effect did not carry over to environmental preference, and males (unlike females) liked the setting with less refuge (Nasar et al, 1983).

Effects Of And Preferences For Landscapes

A recent study examined post-surgical recovery data for patients in a suburban Pennsylvania hospital to determine whether assignment to a room with a window view of a natural setting might have therapeutic influences. These patients had significantly shorter hospital stays, less complications, higher morale and less pain killers. These findings strongly suggest that the view of trees had comparatively therapeutic influences of the patients (Ulrich, 1986).

Landscape Descriptor Dimensions

Hull and Buhyoff (1983) and Gobster and Chenoweth (1989) have divided landscape dimension into 2 or 3 types; the former use cognitive/psychological and physical/biometric measures, while the latter also use artistic measures.

Most terms can be classified as belonging to one of three "descriptor types": physical; artistic; and psychological. (Gobster and Chenoweth, 1989).

Physical descriptors relate to the external dimensions of the environment - what is "out there" versus what is "in the head". They have been used in expert assessments and in psychophysical studies of aesthetic preference.

Artistic descriptors refer to the formal or abstract, compositional dimensions of the landscape. Examples include unity, variety, vividness, line, colour, texture, contrast, harmony and integrity. They might be thought of as "higher order" constructs of physical landscape dimension - some argue that they have greater aesthetic relevance than basic physical dimensions; others argue that they discount the importance of detail, motion, ephemeral effects, and the emotional and expressive dimensions of landscapes.

Psychological descriptors refer to the psychological impacts that a landscape may have on those who observe or experience it. Studies of this dimension have been criticised because they do not relate to landscape dimensions which can be perceived or managed (Gobster and Chenoweth, 1989).

In contrast to studies of the physical and artistic dimensions of landscapes related to aesthetic quality, studies employing psychological descriptors tend to be less place oriented. Instead, the focus has been more on the outcomes of people's interactions with landscapes, and on the relationships between various psychological dimensions (Gobster and Chenoweth, 1989).

Typically, landscape dimensions fall into one of two general categories: cognitive and psychological constructs or physical and biometric measures. Cognitive dimensions are often studied in attempts to better understand and explain an observer's perceptions of aesthetic quality. Physical dimensions, on the other hand, are by nature more quantifiable and hence are often used to predict perceived aesthetic quality (Hull and Buhyoff, 1983). Complexity can be considered as a cognitive dimension with potentially measurable physical attributes (Hull and Buhyoff, 1983).

Preference Predictors

The results of Calvin et al (1972) suggest that there may be two major dimensions which people use in their subjective assessments of natural beauty. The first was labelled natural scenic beauty; a basic factor in preference for natural scenery appears to be the location of a scene along a dimension from beautiful to ugly. A second factor in judging landscape scenery

appears to be a natural force-natural tranquillity factor. Some scenes are regarded as tranquil, others as powerful.

The subjective quality of the landscape experience appears to be multidimensional. Mood, satisfaction, and scenic beauty appraisals co-vary over the course of the hiking experience. Because scenic beauty has a physical referent (the landscape) it is arguably a more objective measure than are measures of mood and satisfaction, which do not have observable, physical referents (Hull and Stewart, 1995).

A distance landscape dimension was found to have a non-monotonic predictive relationship with perceived scenic beauty. The implication of this non-monotonicity is simply that the minimum or maximum influence of a landscape dimension can occur at some medium level of the dimension's range rather than at its extremes (Hull and Buhyoff, 1983). An equally important conclusion is that distance proved to be a very good predictor of perceived scenic beauty.

Characteristics Of High And Low Preference Natural Landscapes
Ulrich (1977) developed a model of visual landscape preference. This model forecasts high preference for scenes with attributes which aid perception and comprehension or which convey an explicit anticipation that additional information can be gained by changing the vantage point. These legibility attributes are complexity, focality, ground surface texture, depth and mystery. A scene should be favoured if (Ulrich, 1977; 1986): complexity, or the number of independently perceived elements in the scene, is moderate to high; the complexity is structured to establish a focal point, and other order or patterning is also present; there is a moderate to high level of depth that is clearly defined;

1. *the ground surface has even or uniform length textures that are relatively smooth;*
2. *a deflected or curving sightline is present, conveying a sense that new landscape information lies immediately beyond the observer's visual bounds;*
3. *judged threat is negligible or absent.*

The most powerful single variable found by Ulrich (1977) was mystery. The presence of this factor heightened attractiveness irrespective of the ranges of the legibility variables. This model illuminated the importance of informational determinants but in order to create a more complete model, statement regarding the effects of colour, water, and ephemeral landscape phenomena, such as clouds and sunsets, should be added (Ulrich, 1977).

View Classification Experiment
View classification attempted to explain some of the patterns of use on a nature trail and some of the connecting unofficial trails. The classification was fairly subjective, but was based on the amount of trees, water and mountains in a view. The results showed a preference for views enclosed by trees and views in the open countryside. While views of the open loch, pine forest and background mountains did well, views where the forest obscured the loch were not well liked (Wherrett, 1994). It is perhaps the sense of mystery that cannot be explored or a sense of threat which deters people from these views. As noted previously, it is the extreme views which score highly, while those which are merely "average" achieve only an average score.

The Difference Between What People Like And What They Look At

The operational definition of Hull and Stewart (1995) of the experience landscape has three parts: the encountered landscape, i.e. the views, people and objects seen; the sequence of which they are encountered; the feelings, thought and other subjective qualities that are experienced concurrently with these views. Three subjective qualities used in the study were mood, satisfaction and scenic beauty appraisal.

Neither scenic views nor ugly views dominated the landscape encountered while hiking. The majority of the encountered landscape is comprised of the more mundane views of the hiking trails, rocks, bushes, and other hikers near the trail - none of which were rated as being exceptionally scenic or ugly. Most attention seems to be directed forward - towards objects near the observer (Hull and Stewart, 1995).

Views containing water or mountains and valleys were rated as being more scenic than views containing ephemeral features, vegetation, or other people. In addition, persons felt significantly more satisfied and more excited when encountering mountains and valleys than when encountering other types of objects (Hull and Stewart, 1995). Results showed that scenic beauty and landscape preference are enhanced by the presence of ephemeral features, distant views, rugged mountains and water (Hull and Stewart, 1995).

In the study, people spent 60% of the time on objects less than 15 meters away, 20% less than 2 meters away and 40% within 5 meters. Attention was less frequently directed to objects in the middle ground (15 to 150 meters). 10% of the views were of objects between 150 and 1km away and more than 20% were of the distant background or horizon (Hull and Stewart, 1995).

The data suggested that the encountered landscape is comprised of views of the following objects: ground (24%), mountains and valleys (20%), trees, bushes, grasses and other vegetation (14%), water features (12%), ephemeral features, such as snow, wildlife and flowers (12%), other people in the landscape (10%) and other (such as signs, sky and views of oneself) (8%) (Hull and Stewart, 1995).

Personal Construct Theory

Personal construct theory (PCT) has a ability to link a person's image and attitude toward a landscape. The benefits of using GIS in presenting the results of perception exercises can be easily seen in the work of Harvey (1995) and others (e.g. Kliskey and Kearsley, 1993; Steinitz, 1990). PCT provides a systematic means of evaluation that relates the constructs used by individuals to a cognitive set which characterises group response to landscape (Fitzgibbon et al, 1985). PCT is based on the theory that "a persons processes are psychologically channelised by the ways in which he anticipates events" (Harvey, 1995).

GIS And Cognitive Criteria

Researchers in environmental perception have concluded that personal experience of landscape can be classed into four general categories: physiographical characteristics, the presence of specific physical features, cognitive variables and viewer interest (Kliskey and Kearsley, 1993; Baldwin et al, 1996). The work of Baldwin et al (1996) aimed to investigate the cognitive and digital interface of landscape value assessment by examining several elements of landscape experience to facilitate their inclusion in GIS.

Whilst the shapes and forms of the world surface can be modelled within the GIS environment it is not so simple to define the specific boundaries of mountains and valleys, plains and plateaux for digital analysis. The identification of the spatial extent of many classes of landscape feature (such as valley and hill) remains inconsistent between individual approaches. Uncertainty in feature definition arises in part because the same location can be considered part of a number of different features simultaneously. Landscape in the foreground of a view will inevitably be viewed at a contrasting scale to that which makes up a distance horizon (Baldwin et al, 1996).

It is believed that associations between the viewer position and the expected viewer satisfaction may be illustrated, and that the aesthetic experience may be determined from a combination of the texture and pattern of the land cover information as and the digital plan form of the viewshed. It is also believed that there are relationships between the number and shape of the horizons present within a landscape and the pleasure experienced by the viewer (Baldwin et al, 1996).

Measurement Of Cognitive Criteria Using GIS

Most GIS operations are deterministic and precise. It is difficult to represent a cognitive environment within a GIS. The paper of Baldwin et al (1996) explored some of the ways in which to use a GIS to subjectively analyse the human perception to landscape.

By identifying specific features and naming them according to their physiographical characteristics, it is suggested that it should be possible to relate cognitive information to such features in an effort to assess the differences in perceived contributions of both micro and macro landscape components within the viewshed. It may also be possible to class the feature as a polygon with an assigned dominance value where the difference in the feature value to that of the surrounding landscape would provide a means of categorising it as integrated, intrusive, dominant etc (Baldwin et al, 1996).

Physiographical characteristics of landscape cognition can be modelled using the technology associated with viewshed analysis. Relief, depth of view, horizon characteristics and shape could all be measured using GIS functionality. It is suggested that cognitive criteria such as drama, mystery and coherence may have measurable surrogates by using the modelled view as a basis for their definition (Baldwin et al, 1996). Some suggestions for such measurements using GIS are described below (Baldwin et al, 1996).

Relief
Relief is an ambiguous concept that is generally considered to be a function of elevation. Using distance and the viewing elevation data in conjunction with relief angles, a measure of relief may be derived which is sensitive to perspective. However, a better indicator of relief is volume (Baldwin et al, 1996).

Depth Of View
It is simple to extract a summary depth of view from the viewing angle function. However, the appropriate inclusion and significance of the incorporation of such a measure within landscape value assessment remains unclear. An alternative approach may be to generate an area weighted mean value (from viewer to all points within the viewshed) or a standard deviation component for all such points (Baldwin et al, 1996).

Horizons
Characteristics of each horizon such as their smoothness and the number of times the horizon is broken could also be incorporated which would provide the first steps to producing a measure of horizon dominance and the subsequent description of individual horizon qualities which may affect view quality (Baldwin et al, 1996). Skyline extraction is not usually available within GIS functionality.

Drama
It is proposed that drama is a function of the corporate effects of physiographical, planiametric and cognitive criteria. It may be possible to assess drama within a GIS by categorising the viewshed into proximal, intermediate and distant viewing areas and combining this element with the maximum and minimum viewing angle. For example:

1) *In the proximal viewing region (0-1km) drama may be created by the presence of a cliff or precipice where the angle of relief is significantly greater than the viewing angle. This could be seen as particularly dramatic.*

2) *In the middle region (1-5km) drama tends to be created by the presence of a peak or significant visible topographic variation to the surrounding area. The viewing angle would be closer to the relief angle and the drama would then be derived from a combination of angle, feature and scale information.*

3) *In the distant viewing area (5km - skyline horizon) drama is created by a large-scale landscape feature such as volcano or mountain range, and as a result, the impact of the viewing angle may be a lesser consideration. In this case, the skyline shape would be combined with view angle and relief components.*

Mystery

By analysis of the horizon characteristics and masking of visible areas, it should be possible to generate a mystery component when combined with land surface and land cover information.

APPENDIX B

METHODOLOGICAL REVIEW AND CRITIQUE

Simon Swaffield & R Foster*, "Community Perceptions of Landscape Values In The High Country"*, DOC Science Report December 2000.

2.1 Landscape Perception Research: A Summary Overview Of Approaches

Prior to the late 1960s community perceptions of landscape received little academic attention. However, there is a long tradition of landscape appreciation as a focus of critical inquiry and creative endeavour within the fine arts and humanities, which can be traced back to the origins of the pastoral convention in classical Greek and Roman poetry (Williams, 1975). In the eighteenth and early nineteenth centuries in England, landscape was a major focus of cultural interest as the merits of concepts such as the beautiful, the sublime and the picturesque were compared and debated, in a search for the most appropriate aesthetic principles for estate improvement. This debate can be interpreted as an early attempt to build a theory of landscape preference, and the concepts developed at that time continued to influence writers, painters and poets through to the twentieth century. Blanche Baugham, for example, when describing the views from the Summit Road above Christchurch in 1916, used terminology that would have been familiar to Gilpin, Knight and Burke, the main protagonists of the 'picturesque' debate some 120 years earlier (Baugham, 1916). Bowring (1997) has demonstrated that picturesque principles continue to underpin the professional practice of landscape architecture in New Zealand to the present day, and as such form an important component of contemporary 'expert' evaluations of landscape (see below).

Geographers and historians also have a long tradition of landscape interpretation, reading the landscape as 'text', and implicitly or explicitly making normative judgements concerning its quality or socio-cultural significance. Kenneth Cumberland provides some of the most systematic early examples of cultural landscape interpretation in New Zealand, in his regional geographies (Cumberland, 1946), whilst Le Heron and Pawson (1995) provide a recent example of a geographical approach to landscape.

The theoretical basis for the 'picturesque' is, as the name implies, largely derived from fine art. A distinctive feature of the original debates in the eighteenth century was their emphasis upon the development of categories of emotional response to landscape. The early geographical approaches to landscape interpretation, on the other hand, tended to use terminology derived from the biophysical sciences and early town planning movements to describe the appearance of landscapes. These aesthetic and geographical sources were drawn together in the 1960s. In the UK the demand grew from pressure for housing development in the rural landscape, and the need for planning policies to protect landscape quality. Fines (1968) undertook one of the earliest systematic areal surveys of rural landscape quality using formal aesthetic indicators; he used a sample of experts to derive his classification of landscape. At the same time, in the USA the passing of the National Environmental Protection Act (NEPA) led to a requirement for evaluation of the visual effects of management practices on federal land. The USDA Forest Service (1973) published an approach to visual forest management that involved describing and evaluating both the formal visual qualities of landscapes and the spatial distribution of these qualities. The USDA work included an assessment of viewer sensitivity (derived from the distance between public viewpoints and the forest being managed), and this recognition of social or community context was to become a dominant influence in landscape evaluation literature later in the
1970s.

A third approach to landscape evaluation which developed around this period was more ecologically based. Ian McHarg, in his highly influential-book' Design with Nature' (1969), argued for regional planning to be based on a systematic expert appraisal of biophysical and ecological patterns and processes. In McHarg's approach, landscape quality was assumed to derive from ecological quality. This led to a focus on concepts such as naturalness, or diversity, as criteria for evaluation.

Most New Zealand landscape evaluation studies over the past 25 years have been based to some degree on the type of expert approaches pioneered by the USDA, Fines and McHarg. Increasingly, 'aesthetic' and 'ecological' attributes are being combined. Both the 1984 Canterbury Regional Study by the Ministry of Works and Development, and the more recent Boffa Miskell Ltd and Lucas Associates Canterbury Regional Landscape Study (1993) were primarily expert based approaches which incorporated both formal aesthetic evaluation, and 'ecological' evaluation. In the earlier study, the 'ecological' dimensions were assessed parametrically (i.e. landform, soils, vegetation etc.). In the latter study, land systems was an integrating concept.

It is important to note that the relationship between 'aesthetic'-and 'ecological' qualities is currently a major area of research and debate. A number of authors have pointed out that perceptions of 'natural' landscapes and ecosystems are frequently influenced by cultural aesthetic traditions, such as the picturesque. However, picturesque values seldom correspond to ecological values. Nassauer (1995) therefore argues that it is problematic to assume that ecological and aesthetic values can be easily combined, and advocates recognising explicitly that ecological goals must be consciously 'framed' in ways that are culturally familiar. This problematic relationship between aesthetic and ecological assessments of landscape values, and the need to analyse carefully the aesthetic assumptions that frequently underly 'ecological' assessments, is a major weakness in many 'expert' based landscape assessments.

From the early 1970s onwards the inclusion of issues of landscape or scenic quality in statutory regulation in the USA led to a desire for more explicit and scientifically defensible measures of landscape and visual quality, and approaches based on formal aesthetic principles were challenged by quasi-experimental methods drawn from psychology. Probably the most influential has been Daniel and Boster's 'Scenic Beauty Estimation (SBE) method' (1976). Daniel and Boster argued that scenic beauty is best approached through a stimulus-response model of perception. In this, measurable physical attributes in the environment are assumed to lead to particular responses in the viewer. An aggregate measure of scenic beauty for a particular setting can thus be developed using systematic survey methods that ask people to rate photographs of the setting. Multiple regression analysis then allows predictive models to be constructed, that identify the contribution that any particular element in the landscape (such as a water body) makes to its overall scenic quality. Mosley (1988) provided an early example of the application of SEE in New Zealand, in his assessment of wild and scenic rivers, while Thorn et al (1997) provide a more recent and more sophisticated application.

Publication of the SBE method led to an intense debate in the landscape literature between proponents of essentially quantitative methods (such as Daniel and Boster 1976) and advocates of qualitative methods using expert critics (e.g. Carlson, 1977). In the SBE type methods, particular visual qualities or attributes in landscape are assumed to acquire value by virtue of their contribution to population preference. That is to say, if the presence of a particular feature in a scene statistically 'explains' (or predicts) patterns of preference within a population as a whole, it is assumed to represent scenic beauty.

Critics of this approach, such as Carlson (1977, 1995) argue that preference scores do not indicate 'value'. They may help predict the average preferences of a population, but they say nothing about why this is the case, or about whether this should be the case. Carlson favours

'valuation' based on the philosophical tradition, and argues for wider use of environmental critics.

By 1982 Zube, Sell and Taylor were able to identify four contrasting 'paradigms' of landscape perception in the literature: expert, psychophysical, cognitive and experiential. The ***expert*** *category corresponds broadly to the aesthetic approach of USDA and Fines, while the* ***psychophysical*** *paradigm is typified by the scenic beauty estimation method developed by Daniel and Boster. In addition Zube, Sell and Taylor identified a* ***cognitive*** *paradigm, subsequently perhaps best represented by Kaplan (1985, 1989 etc.), and an* ***experiential*** *paradigm, well expressed by Seamon (1979).*

The ***cognitive*** *approach typically uses quasi-experimental methods, such as preference scoring of photographs, but interprets the results somewhat differently to the psychophysical methods. Kaplan (1985) argued that the results of preference tests could be used as an indicator of basic perceptual processes. She therefore used photographs to assess the meaning assigned by viewers to particular settings. She identified factors such as the degree of naturalness in a scene as important dimensions in determining perceptual response, and subsequently went on to interpret the patterns of response by what she described as a 'functional' model of perception.*

The functional model of landscape perception interprets landscape in terms of its 'survival' and 'use' value. Kaplan focused on the qualities that have been of most value in evolutionary terms, and identified four key dimensions in a landscape setting which have biological and cognitive functional value: coherence, complexity, legibility and mystery. That is, does the scene make sense, is it reasonably rich in detail, can it be easily 'read' in terms of access, and does it provide potential for further investigation - does it draw you in? The functional model has been extensively refined, debated and tested and other variations developed. Ittleson, for example has proposed a 'transactional; model, which emphasises the interaction between development of cognitive categories and responses, and external landscape stimuli (see Hartig, 1993). The essential point of all these, however, is that landscapes can be valued on the basis of the way their composition and spatial structure affect our psychological and biological wellbeing. There has been very little work of this type in New Zealand, although the Auckland Regional Landscape Study (Brown, 1984) is an example of an empirical study which drew in part upon the theoretical elements of the cognitive approach. A number of 'expert' studies have also incorporated some of the indicators of landscape value from the cognitive approach into their criteria for evaluation (Bennett, 1985, provides an early example).

The fourth 'paradigm' identified by Zube, Sell and Taylor explored the qualitative dimensions of landscape perception in more detail, drawing upon a range of theoretical sources. Seamon (1979), for example, focused upon the use of a phenomenological framework of understanding, to assess the significance of individuals' response to particular situations and settings. This experiential approach contrasts dramatically with the psychophysical and cognitive approaches in its approach to valuation. It places priority upon the subjective experience of particular landscapes, rather than attempting to develop objective measures of a population's general response to landscape. Much of the recent work on local community preferences for landscape undertaken in the USA and the UK adopts qualitative methods, similar to those pioneered by Seamon (1979), to determine the features of a local landscape that have particular meaning and significance for its communities. Typical methods include depth interviews, participant observation, and focus groups in which individuals and small selected groups provide researchers with detailed accounts of their particular interests and perceptions. Dominy's work in the upper Rakaia provinces probably the best example of the use of such qualitative methods in New Zealand (1990a, 1993a,b, 1995, 1999b).

One weakness of these earlier studies classified by Zube, Sell and Taylor was their neglect of the social and political context of evaluation. Cosgrove and Daniel (1988) examined the symbolic meaning in landscape, using formal iconographic and materialist perspectives,

arguing that landscape preference is essentially a social product, created in particular cultures and societies by particular social groups. Uzzell (1991) subsequently offered an update on Zube, Sell and Taylor's classification of approaches that included a number of more recent developments in the socio-cultural approach to landscape perception.

The 'socio-cultural' approach seeks to value landscapes on the basis of their social, cultural or political significance. It may use a range of methods. In some studies, the evaluation of significance has been based upon expert 'critical' interpretation of the way landscape values have been recognised in a range of cultural products and processes - for example, in the analysis of images used by communities and their representatives to promote particular locations to tourists (e.g. Perkins and Cloke, 1998). In other studies various social survey techniques have been used to determine landscape significance, ranging from photographic sorting (Q sort) and interviews, to depth interviews and participant observation.

While the 'experiential' and socio-cultural approach both use similar methods of qualitative research (interviews, participant observation etc.) there is a significant different in emphasis in the theoretical framing of the research, and the interpretation of the results. In a socio-cultural approach, there is an assumption that landscape values or significance are fundamentally shared phenomena; an individual's response only assumes significance when placed into a social or cultural context (Andrews, 1979). In contrast, an experiential/ phenomenological approach is interested in the subjective experience of the individual which has significance independent of the social context.

Uzzell (1991) also distinguishes an approach he describes as action research. Action research is a social scientific approach which attempts to link investigation of community attitudes and perceptions with educational programmes and environmental decision making. It typically uses similar methods to other approaches (particularly interviews, questionnaires and focus groups) but carries the results forward into design or decision making workshops, often described as charettes, in which local communities work with local planners and designers to develop policies and plans for their areas, incorporating the results of the earlier surveys. Uzzell notes that this approach does not fit within Zube, Sell and Taylor's model. In this report, we include action research under the socio-cultural approach, given its largely similar methods and its focus on the social and political context of values. There are relatively few New Zealand high country examples: Lucas Associates' work in Hurunui is a good example.

Zube, Sell and Taylor suggest that the different approaches, or paradigms, of landscape evaluation research can be placed upon a spectrum, in terms of the way they each deal with the concept of 'landscape' and with human perception. 'Expert studies tend to treat humans as 'passive' observers of the landscape, and analyse landscape in terms of discrete dimensions (e.g. landform, land cover, cultural features). 'Psychophysical' approaches include humans as respondents, but focus solely on measured responses to particular dimensions of landscape (e.g. 'scenic beauty'). Cognitive (or psychological) approaches are more interested in the cognitive structure of human responses in relation to the physical structure of landscape; socio-cultural approaches focus on how human ideals about and responses to landscape are socially and culturally structured; whilst the experiential, or phenomenological approach is concerned with the way humans are actively 'immersed' in an holistic phenomenon we call landscape. This spectrum is illustrated in Figure 1.

In the 1990s we are therefore faced with a somewhat perplexing choice of potential approaches to the assessment of community perceptions of landscape values.

Fig. 1 Approaches to landscape evaluation *(adapted from Zube Sell and Taylor 1982)*

	Approach				
	Expert (Aesthetic or ecological)	*Psychophysical*	*Cognitive*	*Soci-cultural*	*Experiential (phenomenological)*
Human	*Passive* →				*Active*
Landscape	*Dimensional* →				*Holistic*

2.2 Overview Of Field Survey Methods

Landscape perception research has used a wide variety of survey methods, reflecting the diversity of disciplinary origins of the work, and the range of approaches (identified above). A useful evaluative distinction in the context of this report is between user independent and user dependent methods. User independent methods are those which assume that landscape values or qualities can be determined by direct reference to the physical and/or visual landscape, without involvement of particular user groups. These typically apply predetermined evaluative criteria to particular landscape settings. The criteria are themselves derived from existing theory or theoretical assumptions. Hence the 'Vamplan' method, for example (Bennett, 1985), systematically applied a series of quality criteria derived from several sources. In general, 'ecological' methods emphasise the use of principles developed from ecological theory (e.g. diversity), whereas 'formalist' methods emphasise principles derived from the fine arts. However, these two approaches are frequently mixed or overlying; hence one of Bennett's criteria was 'naturalness'. Bowring (1997) has argued that one of the problems of such expert' approaches is that they frequently take for granted principles that have been derived from earlier theories, without acknowledgement of the assumptions that come with them.

A number of the more recent socio-cultural approaches also adopt methods that do not involve direct survey of 'user perceptions; for example, semiotics and iconography are based upon critical analysis of 'landscape' representations such as maps, images, photos, advertisements etc. However, although these are 'expert' based methods, the focus of investigation is upon identification of the landscape values being expressed through cultural processes such as advertising. Hence adverts etc. are used as surrogates for other forms of community survey. These approaches are not normative, but attempt to identify the prevailing cultural values that are influential within the community.

The majority of studies of high country landscape to date have been based on 'formalist' and 'ecological' assessment methods. More recently, some studies have used iconographic methods. However, studies of 'community' values must incorporate some direct investigation of users' views, if they are to extend beyond the user independent approaches of most expert studies. For this, we must turn to the wider range of user dependent methods. These can be usefully divided into two broad categories. On the one hand, there are quantitative methods, typically based on the techniques of the natural sciences, or their equivalent in predictive social sciences such as psychology or economics. These are also known as quasi-experimental, in that they follow the same general approach to survey design as the experiential sciences. On the other hand, there are qualitative methods, more typically derived from interpretive social sciences such as, anthropology, cultural geography, or from the humanities.

The key difference between the two groups of methods lies in the intended use of the results. Quantitative, quasi-experimental methods are typically being used to build mathematical

models of relationships (e.g. user preferences for particular landscape attributes), which can then be used to predict future patterns of preference etc. The Scenic Beauty Estimation method described above was developed precisely for this purpose, to enable federal land managers to model the likely effects of management actions upon perceived scenic beauty, in advance of the actions (as part of the federal requirement for environmental assessment). The work of Thorn et at (1997) on forestry impacts in Nelson is intended to achieve the same purpose, enabling private forest managers to predict the effects of their planting and harvesting plans upon perceived scenic beauty, and to thus avoid the worst impacts.

Much of the landscape investigation carried out within the 'cognitive' paradigm also uses quasi-experimental, quantitative methods, typically drawn from psychology, in attempting to develop theoretical models of landscape perception, which can also be used to inform future management and decision making in similar ways to the SBE predictive model. The analysis of wilderness perception by Kliskey (1992) falls generally within this approach.

The key operational significance of the quasi-experimental quantitative methods is that they require carefully controlled and standardised procedures of administration of surveys (hence, quasi-experimental), and require statistical sampling of respondents. That is, the number and choice of people to be surveyed depends on the levels of statistical significance required by the analysis. This is because the aim is to predict population wide patterns of perception based on a selected sample. This requirement can cause practical difficulties in many operational situations.

In landscape perception research, the most common quantitative methods are the ranking and rating of photographs, or questionnaires. In photographic ranking and rating, photographs are used as surrogates for the 'real' landscape (Shuttleworth, 1980). Typically, photographs are taken by the researcher, on the basis of a predetermined sample design. Sometimes this is a random survey of views within a defined area; at others it is photographs of predetermined landscape features, identified as being of potential significance. The precise selection, framing, Xposure etc. of each photograph is undertaken according to standardised procedures, to avoid bias towards any particular image. The photos are then presented to respondents in a variety of ways, most typically as slides projected onto a large screen, and the respondents are given a standardised set of instructions to score or rank the images in particular ways according to the research design. The results are recorded on standardised record sheets, and then typically analysed using one of the now widely available statistical packages.

In questionnaire surveys of landscape values, words are used as indicators of respondents' views or values. In some techniques, the range -of words, used is derived from the respondents themselves; in others they are derived from previous studies, or wider theory. Respondents then select, rank or rate different words or phrases according to their individual evaluation of a particular landscape setting. In some more sophisticated surveys, sets of photographs are evaluated using sets of words as descriptors. In others, the emphasis is upon the identification of the respondents' choice of words to describe particular landscapes. The results are analysed statistically to identify key words and concepts used to describe or value particular landscapes. Other questionnaire methods are more open ended, asking respondents to describe or evaluate landscapes in their own words, which can then be analysed using techniques such as content analysis (counting the occurrence of frequently used words or descriptors).

The outcomes of quasi experimental methods are typically either tables of percentage responses (e.g. "65% of respondents ranked water as a major feature of valued landscapes"), or multivariate equations. Mosley (1988) for example developed the following equation to describe and predict the effect of key variables upon perceived scenic beauty of rivers:

SC = 4.12 + 2.29AFOREST + 0.62 log (ANG PROM) + 0.0007 RELIEF + 3.46 ALPINE + 2.OOAWATER + 1.42 log (CONFINE) - 0.06 COLOR

Interpreted, this says that the main predictors of scenic beauty are the presence of native forest, high relief, alpine rock and snow, water, enclosure, and the colour of the view, with each attribute having a different degree of influence.

In contrast, qualitative methods are largely derived from disciplines where the aim of research is interpretive. That is to say, the outcome is enhanced understanding rather than prediction. This will hopefully lead to improved decision making, but is not intended to provide detailed management prescriptions. The most common methods of qualitative landscape research are depth interviews and focus groups, where selected individuals or groups are encouraged to describe and discuss in detail their values and preferences with respect to a particular landscape settings.

The purpose of these methods is to identify landscape values and meanings as they are subjectively defined and experienced by the respondents.

Just as in quasi-experimental methods, there is a large body of literature that deals with procedural requirements. The focus, however, is not standardisation in an experimental sense, but to ensure maximal integrity of the recording and interpretation of individual subjectivity and group beliefs. The interviewer/researcher is the research instrument, and must be acutely self aware of how the respondents' perceptions and values are drawn out and interpreted. The outcome is a 'rich' description of individuals' or groups' values. Selection of respondents is not based upon statistical sampling, which is theoretically meaningless in this context. Instead, respondents are selected as key informants according to their expected significance to the study. Swaffield (1994), for example, wished to investigate language used by policy makers and policy influencers, and therefore selected informants from a range of policy relevant interest groups. Similarly, Fairweather and Swaffield (1995) selected key informants from a range of community sectors in the Mackenzie / Waitaki Basin. The outcome is not a predictive model of the whole population (however defined), but a profile of views (meanings, values) that exist within the target community.

One advantage of using key informants rather than population sampling in many New Zealand situations is that it enables researchers to identify the range of views held, and to characterise the types of people holding those views, in a relatively efficient way. A problem with quasi-experimental statistical sampling is that in many rural or high country settings, the 'population' is very difficult to define - it typically comprises a small number of residents, different interest groups, and a range of visitors from elsewhere in New Zealand and overseas. Morris et al (1997) found, for example, that in the Mackenzie/Waitaki Basin there was no single, homogeneous 'community', but rather a series of overlapping and fragmented communities of interest with differing spatial configurations. Statistical sampling of such 'populations' is problematic.

Other qualitative methods that have been used involve participant observation, where the researcher spends considerable time - possibly months - living and working with a community, recording their everyday lives and actions, and qualitatively analysing key themes or structures of meaning and value in their lives. Dominy's (199596) studies of the Upper Rakaia provide perhaps the best example of this approach (see also Morris et al, 1997).

Focus groups are being widely used in community action research both in New Zealand and overseas, in which key informants and opinion leaders from a community are brought together for periods from several hours to several days. Their interactions are typically orchestrated by one or more researchers, who guide the group through a process of identification of values and valued locations and frequently preferred actions, in relation to a particular landscape setting (e.g. Lucas Associates 1995).

An increasingly popular device is the community 'charette' in which focus groups move from identification of shared values to development of plans or policies for the future. Selection of participants is a critical factor; frequently community groups or organisations are involved in the selection, and a common technique is to incorporate feedback stages into the process so that results of a focus group session or charette are summarised and disseminated back to the wider community, who have the opportunity to comment upon the results, or participate in a subsequent group meeting or stage in the charette. Feedback is also an important feature in much individually focused ethnographical research, in which a researcher may have a succession of meetings with a key informant, clarifying at each stage the conclusions of the preceding meeting before exploring further details or nuances of meaning.

Lucas (1994) used a more systematic form of feedback known as Delphi; this involves key informants responding to a series of questionnaire type surveys in which the results of the previous survey are included in subsequent surveys. The aim in Delphi is to explore the possibility of convergence of views, and hence achievement of a consensus conclusion. Other qualitative techniques involve self administered surveys, in which key informants are asked to keep diaries, or even take photographs, which identify landscape features as expressions of particular value or significance to them.

Finally, it is worth noting that there is a long established research tradition, relatively little used in New Zealand, which draws upon the discipline of phenomenology, in which the emphasis is upon the sensitisation of an experienced researcher to the essential qualities of a landscape and its community. In some-ways this appears superficially to resemble the 'expert' approach discussed above. However, it differs significantly in drawing upon quite different philosophical and disciplinary sources, which emphasise the development of an empathy with a situation which is not structured by previous knowledge (as in most 'expert' approaches), but rather seeks to distil the inherent qualities of a setting by close observation and direct experience. Possibly the most respected historical example of such work is Thoreau's account of Walden Pond. The essential element (which is frequently missing in other methods) is of systematic self reflection.

It will be clear from the preceding account that some types of survey technique can be used in more than one way in landscape perception research. Photographs, for example, have been used as controlled stimuli in quasi-experiential psychophysical research (e.g. Mosley, 1987; Thorn, 1997), or in more socially oriented work, such as Lucas (1994) or Fairweather and Swaffield (1995, 1996). Some methods also 'bridge' approaches. Fairweather and Swaffield's use of Q method; for example, combines the investigation of individuals' subjective responses to photographs or images which evoke particular experiences, with interviews which seek the wider social and cultural context of responses. It thus combines experiential and socio-cultural approaches.

The critical feature in every case, however, must be an explicit recognition and consideration of the theoretical and methodological basis for the research. The advantage of methods such as interviews and questionnaires in being flexible and easy to administer is also a significant potential disadvantage, in that they are easy to administer by field staff, who may insufficient knowledge of, or experience in, their assumptions and applications. This can result in research findings that are lacking in scientific credibility (and hence operational validity).

Figure 2 summarises the methods typically used in different approaches to landscape evaluation.

Fig 2. Methods Used In Different Approaches *(after Zube, Sell & Taylor, 1987; Daniel & Vining, 1983; Uzzell 1991)*

EXPERT		***PSYCHOPHYSICAL***	***COGNITIVE***	***SOCIO-CULTURAL***	***EXPERIENTAL***
USER INDEPENDENT METHODS		***USER DEPENDENT METHODS***			
Ecological	***'Formalist'***	***Predominantly Quantitative***		***Primarily Qualitative***	
Field survey *GIS analysis* *Systematic valuation of biophysical landscape attributes against defined quality criteria based on ecological or biodiversity principles*	*Field survey* *Systematic valuation of visual and physical attributes against defined criteria based on principles of fine art, or derived from cognitive research* *'expert' critique from philosophical principles of aesthetics*	*Quasi-experimental surveys of landscape users (visitors, community, general population using photographs which are rated or ranked according to perceived beauty, attractiveness, etc. and analysed using multiple regression types techniques*	*Quasi-experimental photo-preference surveys(as in psychophysical) used to test hypotheses derived from 'functional' themes of perception, etc.* *Quasi-experimental questionnaire surveys based on psychological techniques (e.g. semantic differentials) to determine meanings assigned to landscape settings or features*	*Ethnographic type surveys (e.g. participant observation, depth interviews, focus groups, self administered surveys interpreted by reference to social and political interests, or cultural theory* *Iconographic or semiotic analysis of cultural products (e.g. advertisements)* *Action research (e.g. charettes)*	*Ethnographic surveys of key informants* *Qualitative analysis and interpretation* *Self reflection upon key landscape phenomena*

2.3 Evaluation Criteria For Selecting Methods To Identify Community Landscape Values

2.3.1 Existing Criteria

There is very little published literature which attempts to systematically evaluate the full range of approaches and methods being used for landscape perception research. As noted above, Zube Sell and Taylor (19982) and Uzzell (1991) developed classifications, but neither undertook a comparative evaluation against a specified standard. However, in 1983 Daniel and Vining developed a set of criteria for selection of methods, which is still widely cited. They specified four key criteria reliability, sensitivity, validity and utility, and explain them as follows.

Reliability is a test of consistency. It asks, will any particular method produce agreement in measuring the same type of phenomena in different applications? They argue that methods such as expert evaluation are of questionable reliability, in that different experts are likely to evaluate the 'same' phenomena differently, and even that any individual expert will make different judgements at different times. However, they acknowledge that there is insufficient data on this. In contrast, they argue that psychophysical methods have been developed to a high level of reliability, and this has been demonstrated by numerous consistency tests.

Sensitivity is a test of whether a method is sensitive to changes in the phenomena being measured. A sensitive method will identify even minor variations in the way an individual or community values a particular landscape, whereas an insensitive method may only identify major shifts or differences in values. Daniel and Vining note that phenomenological or

experiential methods are highly sensitive to subtle differences in landscape quality (or value). In contrast, they argue that 'expert' approaches are limited in their sensitivity by the nature of the categories that are typically used for evaluation. Describing a landscape in terms of overall 'naturalness', for example, could disguise a wide range of detailed variations in ecological modification.

Validity is Daniel and Vining's third criterion, and assesses the extent to which a particular method actually measures the quality it claims to measure. In the context in which they were writing, this referred to whether any particular method actually identified landscape "quality". In the New Zealand context, an example would be if a survey is undertaken in order to identify 'outstanding landscapes' in terms of the RMA91, which asks respondents to rank photographs according to their judgement of 'attractiveness', does this equate to an assessment of what is 'outstanding'? Daniel and Vining argue that validity is continually being assessed through practice and policy implementation, and that at any particular point in time it can be best achieved by 'triangulation' - the application of different methods to the same phenomena. If two or more methods produce similar results, they argue, there can be greater confidence in their validity.

Finally, utility is acknowledged by Daniel and Vining as an important criterion. Utility refers to the efficiency of a method - does it produce reliable, valid results at relatively low cost in time, materials and personnel - and to its generality - can it be used with little or no modification in a wide range of settings? One of the major attractions of 'expert' methods, they argue, has been their high degree of utility; it was precisely this need which led to Bennett's standardised Vamplan approach. It could also be argued that it has been consideration of utility that has led to the dominance of expert approaches in recent years.

Using this set of criteria, Daniel and Vining argued for further development of the psychophysical and cognitive approaches, which they believed held most promise for the future. This suggestion and the criteria upon which it is based have not gone unchallenged, however (Carlson 1995, Wood 1988). The main point of contention is that Daniel and Vining place very heavy emphasis upon measurement of landscape preference, and upon development of predictive models of preference, and draw extensively upon psychology for their approach and evaluation. This emphasis can be questioned on the grounds that firstly, the approach adopted by Daniel and Vining is not without its own limitations, and secondly that there are other disciplines with valid approaches to landscape values, and other ways of evaluating research methods. Carlson for example argues that the emphasis upon measurement and prediction favoured by Daniel and Vining tell us very little about why certain landscapes are preferred or valued. Wood goes further arguing that the type of approach they advocate actively diminishes our understanding of landscape , by narrowing the focus of investigation to a detached, 2D visual image, as opposed to the full range of landscape experience.

It is therefore important to recognise the possibility of other evaluation criteria in selecting methods for assessing community perceptions of landscape values, particularly those that involve qualitative approaches. Silverman (1985) for example proposed that for evaluation of qualitative methods in social science the key criteria should be the plausibility, coherence, richness and theoretical fruitfulness of the results. Plausibility and coherence refer to whether findings of the research make sense in the wider context, and whether they 'hang together'; richness refers to the extent to which they provide new empirical knowledge, while theoretical fruitfulness refers to whether the research has raised or clarified theoretical questions. These criteria focus on the interpretive significance of research, that is, does it help us understand why certain landscapes are valued, rather than predicting what those values are likely to be in a given population. They are therefore quite different in emphasis from the criteria proposed by Daniel and Vining, and if applied to the five approaches reviewed above, would produce quite different conclusions.

More recently, Baxter and Eyles (1997) have offered additional criteria for assessment of qualitative research. Based upon a review of published articles within cultural geography, Baxter and Eyles suggest that four criteria should be used in assessing research findings: credibility, transferability, dependability and confirmability. A test of credibility asks whether a piece of work offers an authentic representation of the experience being investigated; transferability is an assessment of whether the findings can be extended beyond the study situation; dependability is a test of whether idiosyncrasies and variability in researchers' approach and interpretation can be minimised; and confirmability assesses the extent to which results can be checked by third parties.

In discussing these criteria, Baxter and Eyles acknowledge that they are analogous to conventional criteria used in quantitative evaluation (e.g. Daniel and Vining's criteria), but argue that they are not the same, as the nature of the tests is different. In other words, they accept that both quantitative and qualitative research may be evaluated in broadly similar ways, but argue that the detailed tests must differ, in recognition of the differences in the nature of the research traditions.

2.3.2 Application To Investigation Of Community Perceptions In NZ

One of the problems in attempting to translate these criteria directly into operational situations in New Zealand is that they are highly generic, and are primarily aimed at the research community, rather than at operational managers. They emphasise dimensions of research which are vital in developing improved theory, and which can meet international peer reviewed standards. Furthermore, as noted, there are significant differences in emphasis possible depending upon whether the research is primarily predictive or interpretive in nature. In their basic form, therefore, they do not provide a practical guide for operational managers needing to evaluate existing research or specify new work.

In order to develop a working guide it is necessary to explore further the purpose of research into community perceptions of landscape value. It was argued in the introduction that improved understanding of community perceptions is an important part of conservation management, but such understanding could be needed and used in a number of different ways. At the macro scale, there is a potential need to improve our understanding of how more general theories of landscape perception apply to New Zealand communities. At present most of the theoretical knowledge about landscape values which underpins operational decisions is derived from overseas publications. There is a growing concern within other social science disciplines that theoretical models developed overseas may not be directly applicable to New Zealand's unique social and cultural conditions, and therefore require testing and refinement in New Zealand before being used in management. This is likely to apply as much to landscape perception as to other aspects of social theory.

A second possible requirement for landscape research is to enhance our overall understanding of the high country, and provide a context against which government policy might be developed. There are clearly major policy initiatives in regard to tenure and land management currently being considered, yet as the following chapter shows, current knowledge of community perceptions of landscape values is fragmented and very incomplete.

A third potential research need is to describe in detail community perceptions of landscape values on a particular issue, as part of the public evaluation of a specific regional or district policy, a proposed development, or proposed management strategy. This is likely to be a continuing requirement, and is the area in which methods and results come under close scrutiny both by the communities affected, and by decision making bodies such as planning authorities, conservation boards, and the Environment Court. It may also require periodic monitoring of community perceptions.

Finally, knowledge on community perceptions may be required as a specific input to local management decisions, either with the intention of minimising opposition to proposed change, or of directing management actions towards meeting specific community concerns.

Each of these research needs has significantly different priorities, in terms of the generic criteria identified above. The requirements for knowledge intended to refine theory come closest to the criteria of Daniel and Vining, and Baxter and Eyles. The main additional criterion is the self evident requirement of relevance to the theoretical tradition being addressed.

Knowledge about community perceptions of landscape values required for overall policy formation must meet three requirements. Most importantly, it must be credible to politicians and the public, that is, it must be seen to provide an authentic representation of values held by a wide community. Policy analysts require it to provide insight into policy relevant issues. Finally, senior managers require the knowledge to be dependable, and not be subject to individual researcher bias.

In preparing evidence on community landscape values for public hearings into development or management proposals there are two key audiences. First, hearing authorities and the Environment Court require evidence that is objective and independent, which in terms of the criteria reviewed equates in general terms to being dependable. There is also a need for a sensitive understanding of community values concerning particular landscapes. This is essential to achieve credibility with the community itself. Any monitoring activity requires reliability as a priority, in order to ensure comparisons are valid.

Finally, at the operational level, managers typically seek focused and robust information that enables them to take decisions; utility is the key priority at this level. However, with increasing community involvement in decisions, credibility is also vital, whilst with increasing accountability being required, knowledge must also be dependable.

Based on this analysis of need, the key criteria proposed for evaluating approaches and methods are credibility, dependability and utility.

***Credibility** is the extent to which a particular method authentically represents community perceptions of landscape values. In other words, if a member of the community sees the research results will they recognise them as a fair and accurate reporting of the landscape values of that community?*

***Dependability** is the extent to which users can be confident that the landscape values reported are not biased by the researchers own interests or prejudices.*

***Utility** is the extent to which the method itself can be easily and economically applied.*

In addition, depending upon the use of the research, it may be important to ask, whether the approach provides good insight into the reasons for particular values being favoured, or not; whether the approach is sensitive to the more subtle nuances within a particular community, and in the case of monitoring in particular, whether the approach proposed is reliable over repeated applications. Figure 3 summarises the differences in emphasis for the three areas of operational research.

Fig. 3: Definition of purpose and criteria for operational research

Purpose	***The questions we are trying to answer***	***Priority***	***Other criteria***
Context for policy	*What are the broader social or cultural values concerning the landscapes we are managing which should be taken into account when policy is developed?*	▪ *Credibility*	▪ *Insight* ▪ *Dependability*
Evidence for evaluation of particular change	*What do communities value in the particular landscape under consideration?* *What impacts will a proposed change have upon community perceptions?* *How do perceptions of value change through time?*	▪ *Dependability*	▪ *Sensitivity* ▪ *Confirmability* ▪ *Reliability*
Operational direction	*What actions should managers take in order to protect or enhance existing values?* *What actions should be taken to minimise negative effects of change?*	▪ *Utility*	▪ *Dependability* ▪ *Credibility*

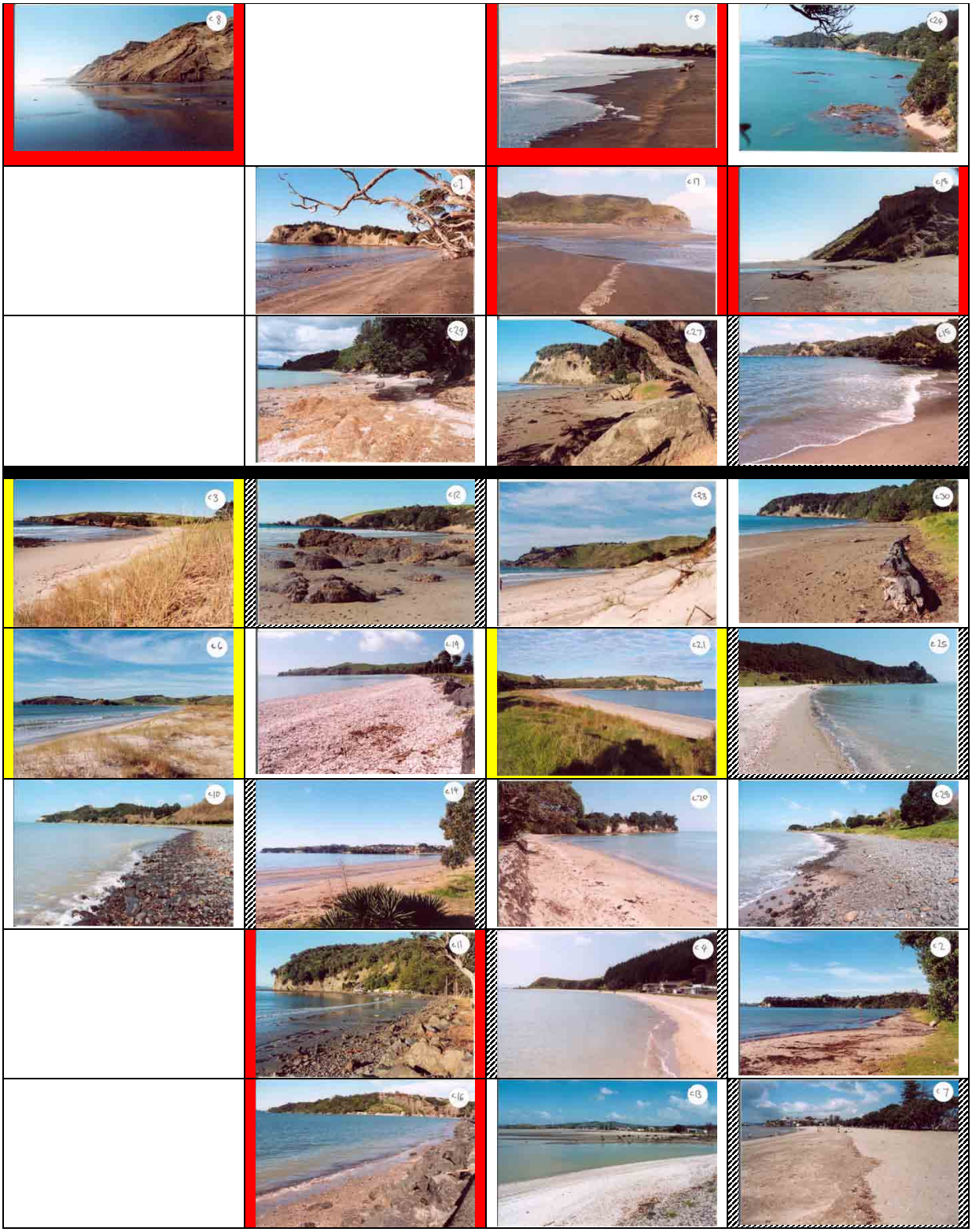
Finally, there is a general requirement for "best practice" in all publically funded activity, which applies to all types of application. In the RMA91, this is expressed in the requirement for cost benefit testing of proposed policies or rules. In the context of this report, it can best be expressed in the expectation that whatever approach or method of investigation is adopted, there is an overriding requirement that it meet the best practice standards prevalent in the particular field. Best practice can be determined in several ways. The normal method in academic research is peer review, for which publication in a peer reviewed publication is a good working indicator. In professional practice, peer review is becoming more prevalent, but is seldom undertaken through independent publications. Professional recognition and awards are good indicators, as are the determinations of the Environment Court. Methods can also be compared with similar methods which have been subject to published peer review.

The approach adopted in this report is to suggest "benchmark" studies which exemplify current best practice in different approaches. This enables account to be taken of the range of indicators identified above. In the next chapter, benchmark studies are identified and briefly discussed for each of the main approaches.

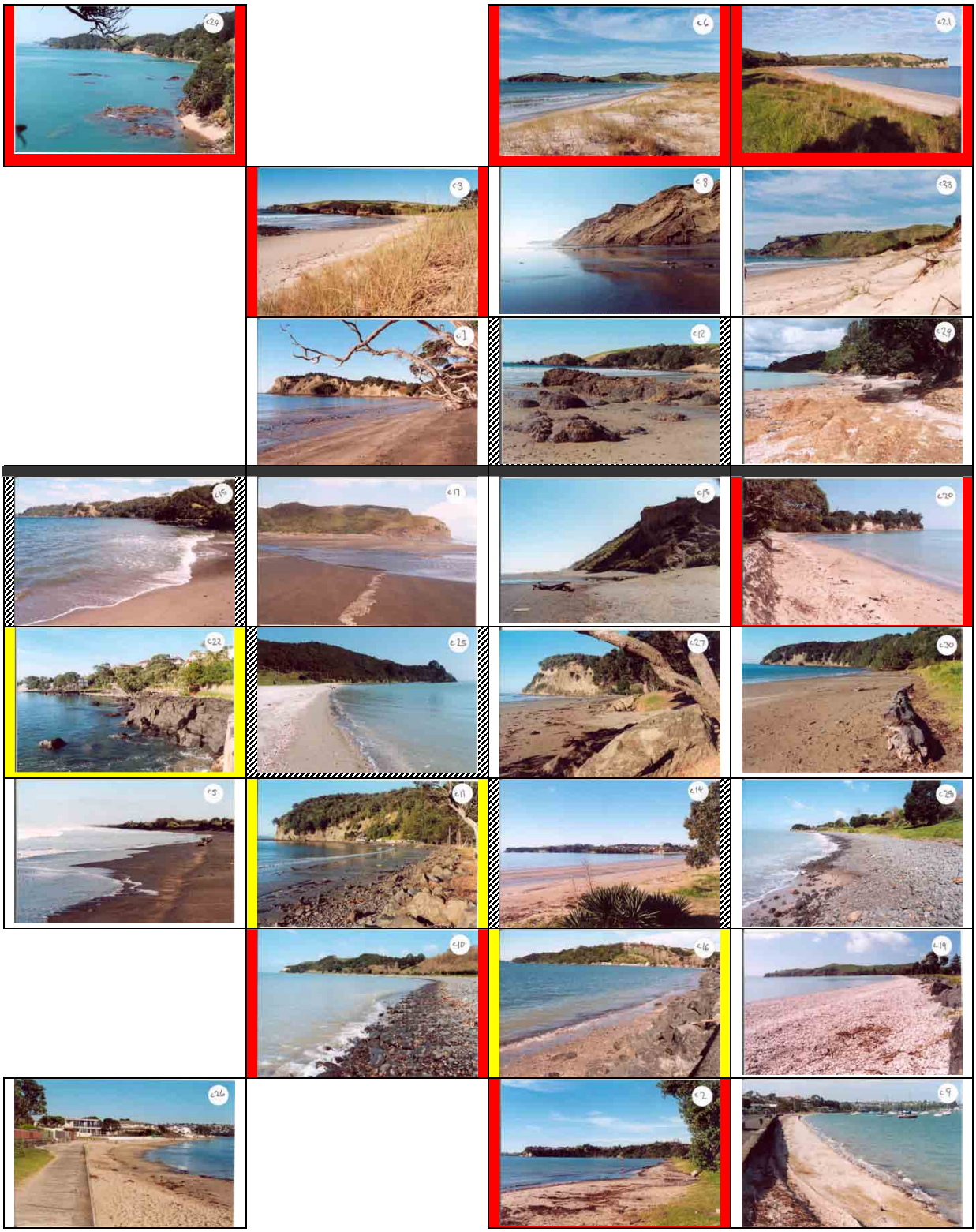
APPENDIX C

Auckland Regional Landscape (2004) Landscape Types - overleaf:

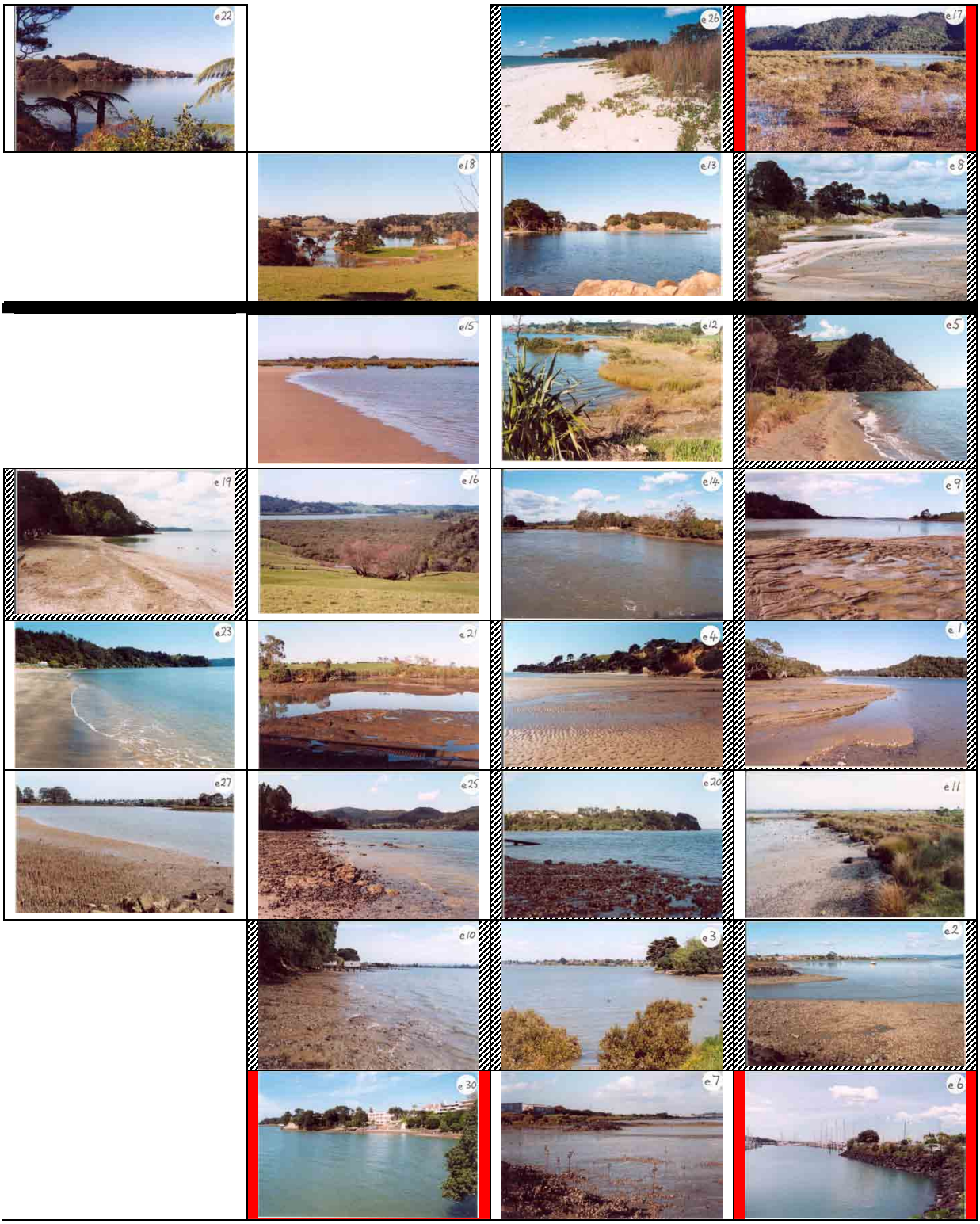
Coastal Factor 1



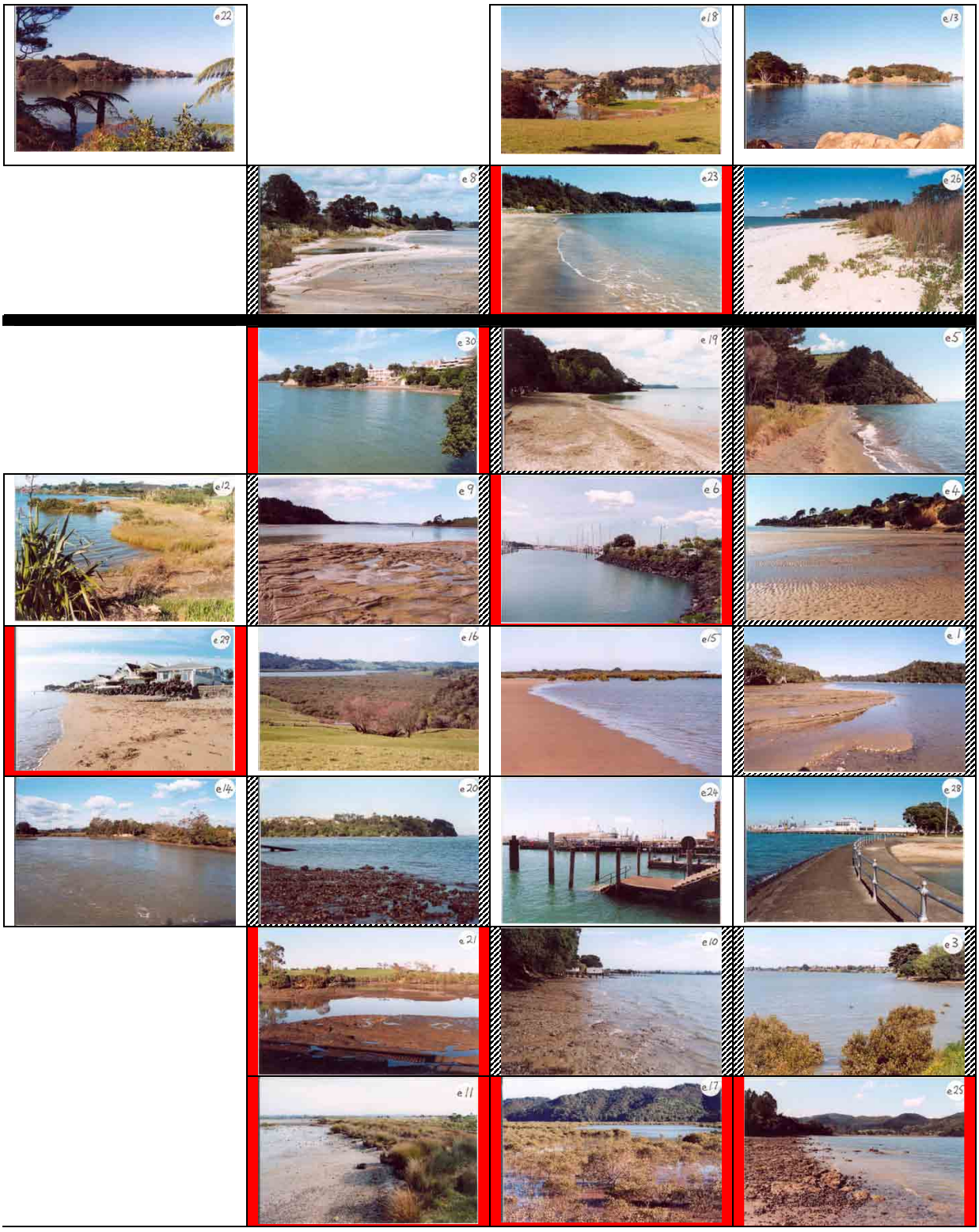
Coastal Factor 2



Estuary / Harbour Factor 1



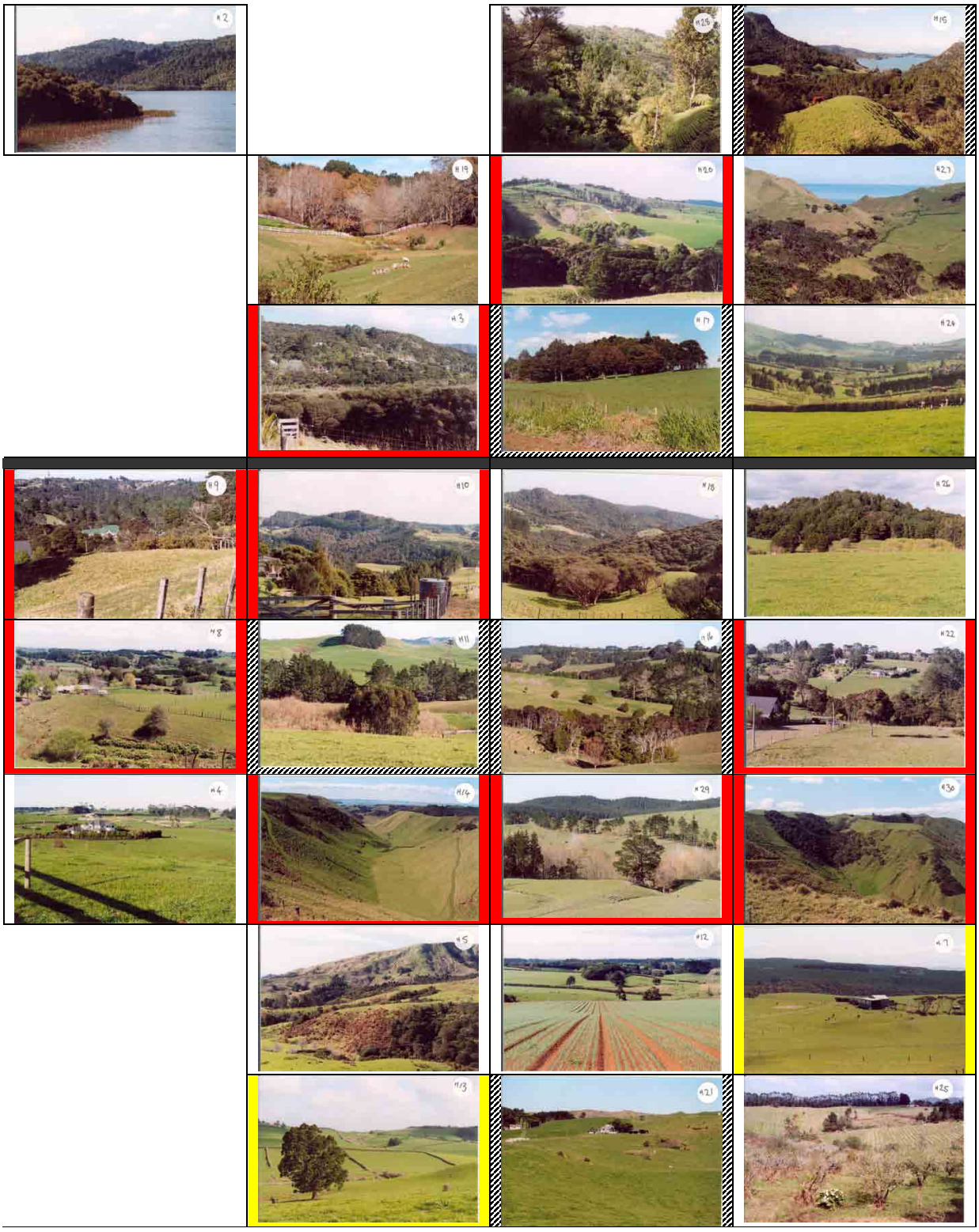
Estuary / Harbour Factor 2



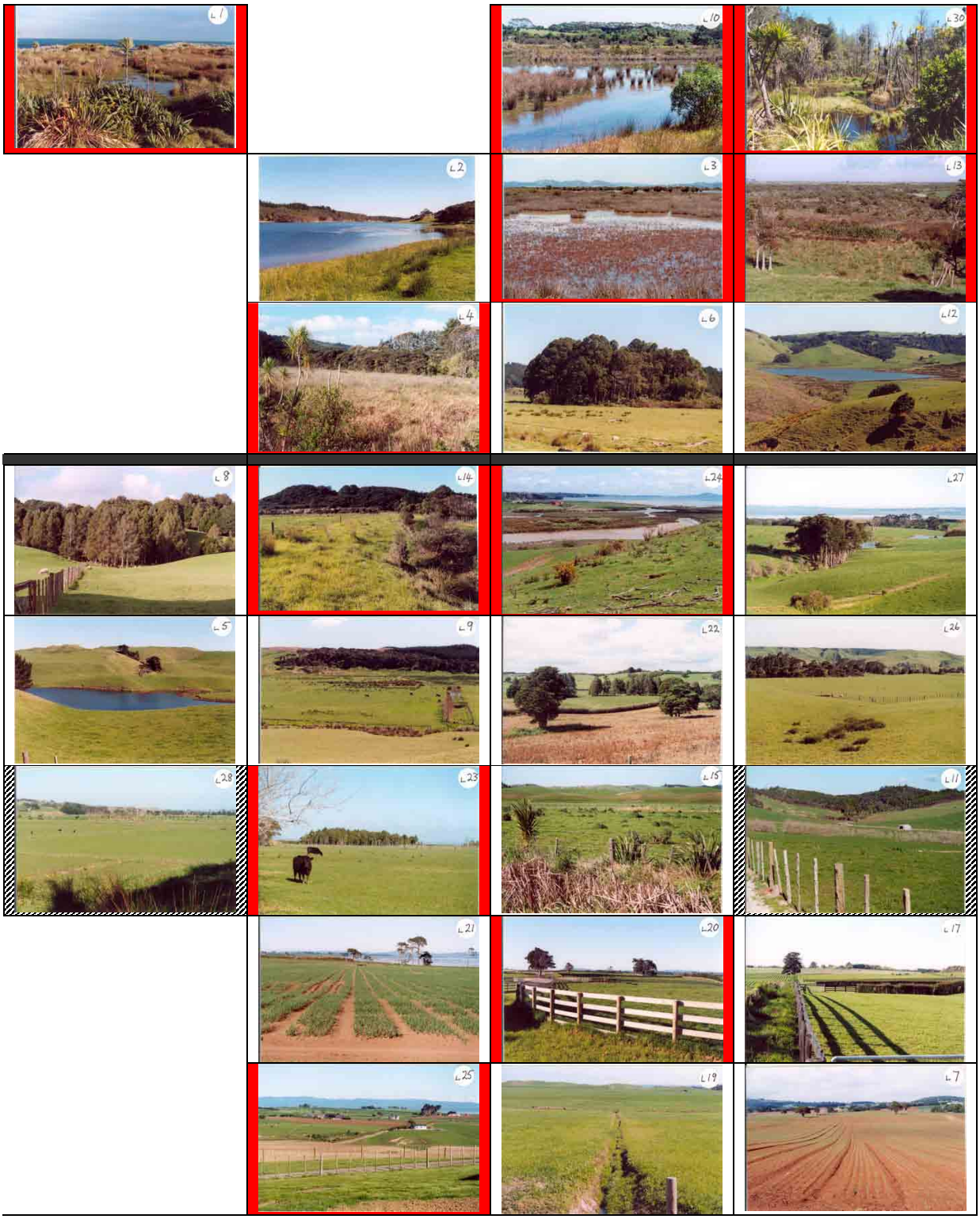
Hill Country / Ranges Factor 1

Hill Country / Ranges Factor 2

Hill Country / Ranges Factor 3

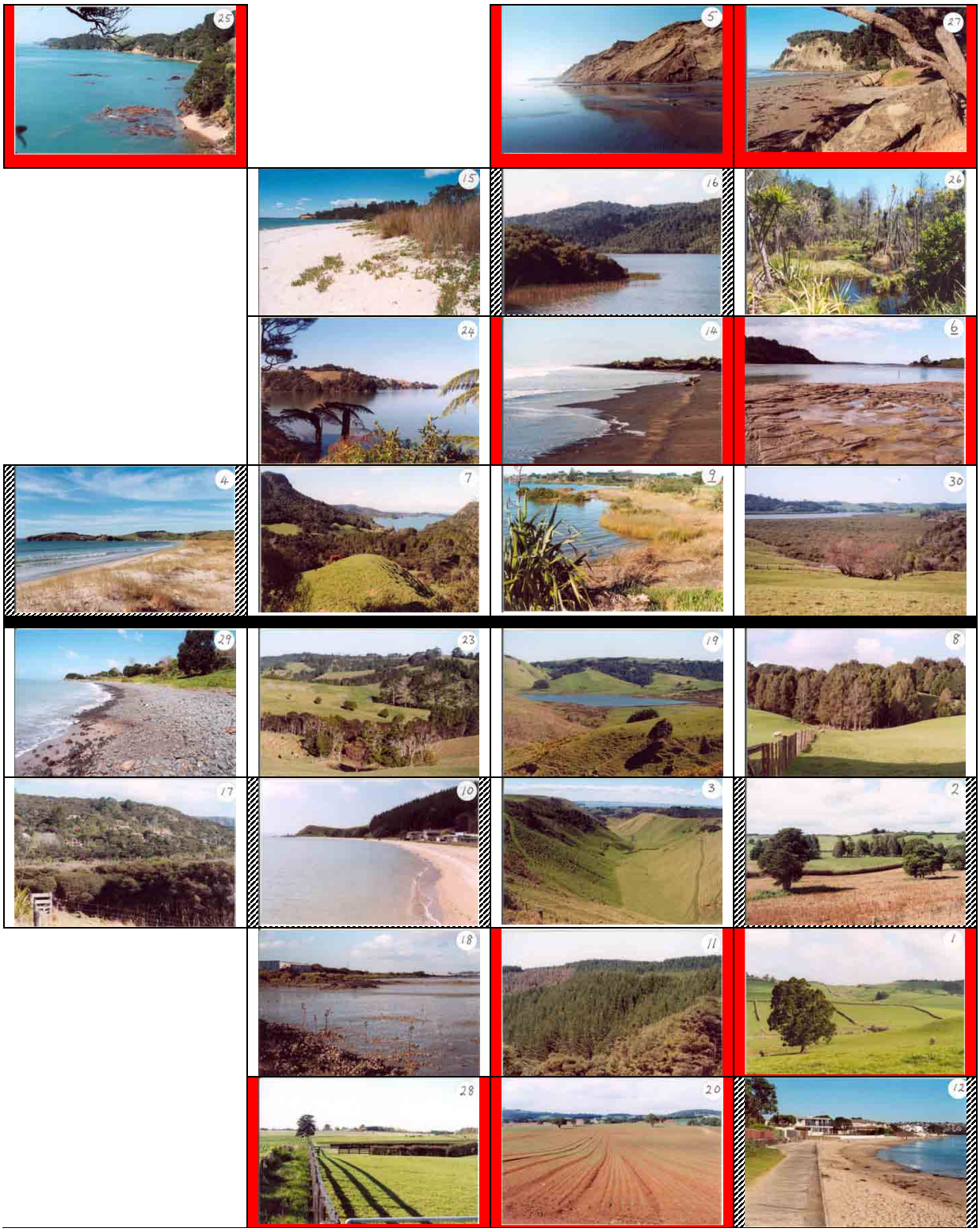


Lowland / Wetlands Factor 1



Lowland / Wetlands Factor 2

Combined Factor 1



Combined Factor 2