Ecological Society Newsletter

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SOCIETY FINANCES AND JOURNAL FUTURES

At the AGM in Hokitika – while partaking in an excellent conference thanks to Craig and team – Society finances and the future of our Journal were discussed at some length. Two "actions" were agreed:

* your Council would revise the 1995/96 budget, review current expenditure, and make recommendations on income needs.
* all Society members would be sent a questionnaire regarding various options for the Journal publication and financing.

At the Council meeting in 14 November 1994 budgetary needs for 1995/96 were reviewed, particularly in light of our failure to gain an additional Lottery Board Grant.

To ensure we can continue to finance our Society's activities through 1995/96, regardless of what is decided next year about Journal publishing, your Council decided (after considerable debate!) it was necessary to increase membership and subscription rates to the following levels:

Full members: $65/year
Unwaged members: $25/year
Journal Subscriptions:
New Zealand $100/year
Overseas NZ$110/year

Assuming membership remains approximately 430-440, with the proportion of unwaged members staying the same, the increases will generate about $10,100 per year.

The increases will become effective in April 1995. While any increases are regrettable, Society subscriptions and membership fees have been very modest, and still are at the new rates when compared with other similar professional societies.

These increases will ensure we can continue to publish our Journal and newsletter and be proactive in the submissions arena.

I look forward to your continued support.

The survey on future options for our Journal will be circulated with the February newsletter. The Council looks forward to a high level of response from members.

Merry Christmas.

J Morgan Williams
President.

IMPORTANT NOTICE FROM COUNCIL REGARDING MEMBERSHIP SUBSCRIPTIONS

ALL MEMBERS PLEASE NOTE Council passed a motion on 14 November 1994 to the effect that members who are 2 years or more in arrears will be removed from membership on 31 January 1995, unless their arrears have been paid by that date.

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COMMENTS SOUGHT ON *JOURNAL* BINDING

You may have noticed that the latest issue of the *New Zealand Journal of Ecology* Vol 17 (2), 1993 – the goat –was bound rather differently to past issues, which have been folded and stitched prior to gluing. This last issue was "burst-bound" where all pages are glued but not stitched. This method is much cheaper than our old system, and involves different pagination at the printing stage. Members are asked to advise the editor if this new method proves unsatisfactory (individual copies can be repaired at the *Journal*'s printers) to assist in decisions about continuing it.

G L Rapson, Journal Editor

CONFERENCE 1995 IS IN PALMERSTON NORTH

A change from three academic terms to two teaching semesters at Massey University means that the 1995 Annual Conference of the Ecological Society will be held in July, a month earlier than our traditional date. Here are the details:

DATES:	Student Meeting	Sunday 9 July
	Paper Sessions	Monday 10 July
		Tuesday 11 July
		Wednesday 12 July
	Field Trips	Thursday 13 July
PLACE:	Massey University Campus, Palmerston North	

The organiser is Clare Veltman in the Department of Ecology at Massey. For more information, contact her at

Phone 06-356 9099 Fax 06-350 5623
Email cveltman@massey.ac.nz

SCIENTIFIC SYMPOSIUM

THE A J NICHOLSON CENTENARY MEETING: ON THE FRONTIERS OF POPULATION ECOLOGY, 18 –22 APRIL 1995, CANBERRA, AUSTRALIA.

Further details/final circular from: Mrs L Lawrence, CSIRO Division of Entomology, GPO Box 1700, Canberra, ACT, 2601, Australia.

The scientific symposium is a special event to celebrate the centenary of the birth of A J Nicholson (1895 –1969). It will include presentations on current research on the population ecology of organisms from a broad range of taxa, and from the perspective of theoreticians and applied ecologists.

CHANGES IN MEMBERSHIP

We welcome the following new members:

Ralph Bungard	Hazel Chapman
Karen Denyer	Richard Greig
Hella Janssen	Andrew McLachlan
Gillian Vaughan	Susan Wiser

We have recieved the resignations of:

A C Christie	Dave Hunt
W L McLea	Nigel Langham
P J McKendry	C Pugsly
Warwick Silvester	C Tanner.

ROYAL SOCIETY OF NEW ZEALAND – CODE OF ETHICS FOR SCIENTISTS AND TECHNOLOGISTS

Members of the Royal Society of New Zealand recently received a letter from the Society which included a draft code of ethics for scientists and technologists. The Interim Board of the Society called for comments from members on this code before 30 November.

The NZ Ecological Society is a Constituent Society of the Royal Society of New Zealand, however Ecological Society Members who are not also individual members of the Royal Society do not receive such information, and nor do members of local branches of the Royal Society.

To quote from the recent (undated) letter:

"Individual membership of the Royal Society of New Zealand is a new concept being written into the restructured Royal New Zealand Society for Science and Technology which legally comes into being when a new Act is passed through Parliament in 1995.

"Individual members pay an annual fee, subscribe to the statutory objects and objectives, agree to abide by the Code of Ethics (where this is relevant to their work), vote in electoral colleges for Board members, and take part in the Society's activities. Membership of branches and membership of the RSNZ is quite separate. People may be members of one or the other or both."

ECOLOGICAL EFFECTS OF TOURISM

Some Notes from Discussion at New Zealand Ecological Society Conference, Hokitika, August 1994

The session was attended by about 30 Society members, as well as some local DOC staff. Judith Roper-Lindsay opened the session by outlining some of the matters which had prompted this Discussion. These included:

- the increasing number of overseas tourists visiting New Zealand, and their potential environmental impacts; it is expected that 3 million people will visit this country in the year 2000;
- the increasing numbers of people using the Department of Conservation Estate, including both Kiwi's and overseas tourists;
- a decrease in funding for the Department, making it increasingly difficult to manage people and natural values;
- the lack of government guidelines or policies to recognise the importance of the natural environment in attracting tourists and therefore the importance of protecting them;
- the apparent gaps in ecological information in tourism policy and promotion;

The New Zealand Conservation Authority has made the link between conservation and tourism one of its priority areas of concern for this term of office. In particular it will be looking for ways to ensure that ecological factors are considered in decisions about management of natural values in response to tourism. The Conservation and Tourism Liaison group, set up by the NZCA brings together people from both areas of interest.

The aim of the Discussion session was to raise awareness of the issues among ecologists, and to identify important issues.

The main points to emerge were:

- there is a lack of ecological science in many of the decisions about tourism and conservation management; this is due in part to the lack of readily available data, and in part because there is no time to collect data in the time for processing requests (eg concessions); also "ecotourism" is a rather nebulous term
- there is little research into the ecological effects of tourism; there are a few specific pieces of research under way, for example:
  - work at Tairoa Head, Kapiti and the Coast to Coast, looking at visitor numbers and effects;
  - research on marine mammals;
  - observations on birds on sub-Antarctic Islands and in Antarctica
- research needs to be site and species specific, since the behaviour of species under different circumstances must be considered;
- there is pressure on DOC to "enable" people to carry out tourist activities (eg guiding and other concessions); this leads them to abandon the precautionary approach which might seem more ecologically sound (and is part of the Agenda 21 outcome from the Rio conference);
- there is some (limited) "research by management", including times when tourist operators provide information to DOC which can help with assessment of effects; however, some are reluctant to provide information which may have an adverse effect on them, or to pay for a permit and then give away information;
- scientists are generally not aware of the tourism industry infrastructure nor of the objectives of the industry (eg growth targets); this means that scientist do not often have any input to the industry proposals; the industry is gearing up to prove that there are no adverse effects of tourists - scientists must be prepared to show otherwise if they believe there are adverse effects
- the Department of Conservation's Visitor Strategy has now been released for public comment; this is an opportunity for ecologists to have an input into the Department's approach to visitors and tourism
- off the DOC estate, Regional and local authorities must become aware of the ecological effects of tourism

It was agreed that more information for ecologists about the tourism industry and its objectives would be useful –DOC staff will provide some information on this for the newsletter. Judith will ask the Society's Council to make a submission on the "Visitor Strategy", while encouraging all members to make individual submissions.

Anyone wishing to contribute to the Society's submission on the Visitor Strategy should contact Judith Roper-Lindsay (Ph work: 03- 379 9119; or home fax: 03-313 5071) before 30 November if possible.

IMPACT OF TOURISM/ RECREATION

Reporting direct observations is an important help for the Department of Conservation when they consider the impact of tourism/recreation upon natural values. Hard evidence of simple environmental impacts is lacking. From such evidence cases to control and investigate impacts can be justified. Recent requirements for direct observations include:

- by-catch of set netting
- dogs harassing penguins and other wildlife
- tourism operators disturbing wildlife.

If you observe any of these or other impacts, please contact the nearest DoC office.

Graeme Loh, Department of Conservation

NEW ZEALAND JOURNAL OF ECOLOGY – 40-YEAR INDEX AVAILABLE

The *New Zealand Journal of Ecology* Vol 17 (2), 1993 contained the cumulative index of all issues from 1953 –1993. Reprints of this index are available at a cost of $5, cheque made payable to the New Zealand Ecological Society and requests sent to the editor, Dr G L Rapson, Department of Ecology, Massey University, Palmerston North.

NHBS: BOOK SUPPLIERS TO THE INTERNATIONAL ENVIRONMENTAL COMMUNITY

Natural History Book Service Ltd
2-3 Wills Road, Totnes, Devon TQ9 5XN,
United Kingdom
Telephone: +44-803-865913
Fax: +44-803-865280
E-mail: nhbs@gn.apc.org

The 62 page NHBS Spring/Summer 1994 Ecology & Environment Catalogue includes titles on Biological Science, Evolutionary Biology, Ecological Science, Ecosystems, Habitat and Species Conservation, Environmental Science, Environmental Studies, Natural Resources –use and management, and People and the Environment.

SUMMARY OF THE GOVERNMENT'S CLIMATE CHANGE POLICY

Introduction

New Zealand is committed under the Framework Convention on Climate Change (FCCC) to implement measures to limit CO_2 emissions and protect and enhance sinks. Climate change is an important environmental issue which is being addressed by the international community as a whole. New Zealand will continue to play a constructive role in that global effort.

The Government has agreed to a series of measures which will ensure that:

- New Zealand's net CO_2 emissions are stabilised at 1990 levels by the year 2000;
- this is achieved by an appropriate balance of measures to reduce emissions and enhance sinks.

In developing its policy, the Government has carried out a detailed analysis and extensive consultation. A wide range of considerations has been taken into account, including:

- New Zealand's commitments under the FCCC;
- maintaining economic growth;
- minimising adverse impacts on the environment.

Ministers weighed these factors carefully in developing the Government's policy.

Policy Summary

The Policy Package announced in July 1994 contains three central elements:

a the development and monitoring of voluntary agreements with industry to limit emissions of CO_2 by 2000;

b the Energy Efficiency Strategy, which includes energy efficiency and renewable energy measures, coordinated by the Energy Efficiency and Conservation Authority (EECA). The effectiveness of this strategy in reducing emissions will be assessed by 31 March 1995 with a view to strengthening of this strategy's measures if they are not proving sufficiently effective;

c a low-level carbon charge to be implemented by 1 December 1997 if, by 30 June 1997, it is assessed that New Zealand's total CO_2 emissions are not on track to be reduced below specified target levels (which depend on growth in gross domestic product –GDP) by the year 2000.

Target Levels

Because the carbon charge is conditional, the target emission reduction levels which need to be

achieved if the introduction of the charge is to be avoided are important.

The Government has specified a target that involves a fixed relationship between reliance on emissions reduction and reliance on sinks in seeking to stabilise carbon dioxide emissions at 1990 levels by the year 2000. Whatever the GDP growth and associated "business as usual" growth in emissions, emission reductions will contribute 20% and sink enhancement 80% towards stabilisation of emissions at 1990 levels.

At 2% GDP growth, the Government's target is a reduction in emissions to 3% below the level they would have reached with the 21.6% growth which would have occurred under "business as usual".

Thus, for 2% GDP growth, the growth in emissions by 2000 will need to be limited to 14.2% above 1990 levels if the introduction of a carbon charge is to be avoided. And for 3% GDP growth, the growth in emissions will need to be limited to 17.3% above 1990 levels if a carbon charge is to be avoided.

Process

The Government in July also decided that:

a the Ministry of Commerce, in consultation with relevant agencies, would report to the Cabinet Committee on Enterprise, Industry and Environment by 30 November 1994 on implementation and monitoring details and any legislative requirements in respect of voluntary agreements;

b Treasury, in consultation with relevant agencies, would report to the Cabinet Committee on Expenditure Control and Revenue by 30 November 1996 on options for dealing with the revenue generated, including those that achieve revenue neutrality, for the carbon charge;

c the Officials Tax Committee would report to the Cabinet Committee on Expenditure Control and Revenue by 31 August 1994 with a timeline for the development of a low level carbon charge and its integration with existing energy taxes, in accordance with the generic tax policy process.

This last step has been completed.

Source: Ministry for the Environment, August 1994.

INTRODUCED PLANT AND ANIMAL MANAGEMENT: WHERE TO FROM HERE?

This workshop report is from the 1992 Ecological Society Conference which was received in March 1994.

The history of introduced animals in New Zealand has been characterised by controversy, particularly for many of the larger game animals. With few exceptions, introduced plants have not had the same high profile, although in some cases their impacts have been just as serious as the animal 'pests'. 'Pest' and 'weed' status are value judgements and many introduced species are viewed in a range of ways by different sections of the community. Rather than revisit the fundamental philosophical questions relating to exotic species (particularly the animals) for which there is unlikely to be either consensus or practical outcomes, the workshop concentrated on examining a series of basic questions related to the immediate needs of research and management of introduced plants and animals.

Workshop participants generally accepted the view that most, if not all, our introduced plant and animal species are here to stay. Our efforts should focus, therefore, on long-term management strategies. To some extent this philosophy is being reflected in present management policies and practices for introduced animals where the focus has shifted from reducing pest numbers to reducing pest impact. We need to maintain this focus on impacts and ensure that future research and management is directed to this outcome.

Within this framework, the workshop focused on the following key areas:

- Is sufficient funding available for research into the management of introduced species?
- Who should be paying for this research?
- *Does the Department of Conservation spend adequate funds on research related to introduced species compared with actual control (management) expenditure?*

As expected, the vexed issue of funding created much discussion. While the move away from subsidised control (e.g., rabbits), where the beneficiaries are often shielded from the real economic or ecological implications of the problem, was generally seen as good, the basic user (or beneficiary) pays approach also has problems. In practice, this approach may not be sustainable in the medium or long term for a variety of reasons including changing economic climate, unclear distinction between beneficiaries when conservation and production

values overlap (or are linked in some way), and conflicts between local, regional, and national priorities. A paper presented earlier at the conference highlighted problems with the user pays approach, where even though it could be shown that wallaby control in South Canterbury resulted in economic (and other) benefits, many farmers were reluctant to pay the control costs and remained unconvinced of the value of this control.

It was generally felt that insufficient funds are available, not only for research but also for management, in this area. Even where economic values are at stake there is often a dilemma in determining whether funding for management (let alone research) should be voluntary or obligatory. The 'cost' of the impact of introduced species on New Zealand's indigenous ecosystems has not been properly quantified. Since conservation values are extremely difficult to define in dollar terms, but are essentially national assets, and since for some species there may be a complex mix of beneficiaries from control, this dilemma is increased. However, a number of options are available.

Clearly, FRST is now the principal (but not the only) determiner of research priorities and funding levels, and there was some concern that present expenditure is to some extent influenced by subjective, "amorphous" political lobbying by interest groups and individuals. Therefore, effort must be increased in the areas of environmental education and objective scientific-based lobbying to focus attention in key areas. The present review of FRST output 31 (Land use, flora and fauna) provides a timely opportunity for input in this area, although the recommendation by STEP for a reduction in funding for output 31 will be a problem. Increased coordination of effort (possibly between CRIs), particularly where pest impacts overlap between conservation and production ecosystems (e.g., possums), could lead to increased funding opportunities.

Within the current funding constraints, possibilities exist to augment research directions by taking advantage of opportunities to conduct "research by management". Historically there has usually been a clear distinction between research and management. However, the lack of fundamental knowledge in many areas related to introduced species and the immediate need to implement management plans presents situations where research objectives can be incorporated into ongoing management practices. Undoubtedly, in some cases research findings will eventually lead to modification of management plans in the light of new information and this should be seen as an advantage, particularly since the practices being examined are in practical use.

While this situation may not be ideal, it was seen as one way of "working smarter" and increasing the effectiveness of spending on introduced plants and animals. While a research-based approach to introduced plant and animal problems is typically species-based and may eventually lead to generalised models, the management-based approach is more commonly aimed at the area/habitat level and may therefore not present the possibility of producing universal solutions. The present distinction between ecological processes (output 31) and management technology (output 29: Integrated management of vertebrate pests) research is largely artificial and needs to be addressed. We need to convince FRST that in some situations "research by management" may be the most appropriate strategy.

However, there are instances where both the research and management-based approaches have their advantages. Research objectives are often directed to produce predictive models which enable problems to be tackled before they get out of hand. Unfortunately, the urgency of some of our conservation problems has not always allowed this luxury and "research by management" has been the only alternative in some situations.

Given the difficulty of placing a monetary value on conservation values, how can we best compare conservation risk assessments in order to prioritise research and management options? How can we best avoid "flavour of the month"-type political decisions adversely affecting key research areas and longer-term studies?

While this whole area is particularly complex, it is one where progress must be made if we are to rationalise and justify expenditure on introduced species problems. Although economic techniques such as the contingent valuation method are available, they appear to have little support. For example, some workshop participants seriously questioned the method used by Treasury to value the DoC estate. There was general agreement that the current ad hoc system is unsatisfactory and we need a more balanced system for examining values, and as a basis for setting priorities and allocating funds. For example, there may be some merit in exploring measures of "ecological currency" such as biodiversity indices or species richness for ranking conservation values between areas or habitats.

Regardless of the valuation method adopted, ultimately value judgements will figure in priority setting and funding exercises. We may be forced to accept that much of New Zealand's natural estate has been (and will continue to be) irreversibly modified and that we must establish a system for listing and ranking species (or habitats) to preserve. Together

with considerations of practicality (i.e., solvability, urgency) and funding, this would then form the basis for establishing conservation management priorities and strategies.

The aims of such "national strategies" would be to:

- prepare scientifically-based plans for management of the impact of the introduced species;
- identify knowledge gaps and establish research priorities to collect this information; and
- communicate, discuss, and modify the strategy in conjunction with all relevant/interested groups and stakeholders.

This approach highlights the need for biological information but also introduces questions related to data availability, ownership, and charges which require further discussion. From this point we may proceed to a "triage strategy" for dealing with introduced species problems where we "give up on some things, leave others in the meantime, and work on the critical cases", although the details of such a strategy may differ considerably between research and management.

Is there an ideal balance between plant and animal research? Where should the priorities lie? How can we best assess and compare values at risk from introduced plants and animals?

In general, most workshop participants felt that research funding for introduced plant problems was too low and to some extent this was exacerbated by difficulties in defining the scope of the problem. Whereas "species plans" were seen as an ideal vehicle for addressing management options for introduced animals, there are simply too many introduced plant species for this approach. It was suggested that a national overview statement of introduced plant species problems is required, although many issues and options will need to be addressed at a regional level.

From the workshop discussion, we have identified several areas where the New Zealand Ecological Society (or individual members) could take action:

- lobby FRST and the CRIs with respect to the relationships, links, and overlaps between components of FRST outputs 29 and 31, advantages and opportunities for "research by management", and recommendations of the Science and Technology Expert Panel (STEP);
- work towards national overview statements for introduced plant and animal problems;
- work towards improved methods of economic valuation for the conservation estate and indigenous biota, and provide a critique of current methods; and
- work towards better environmental education both for the general public and also for specific key interest groups.

Wayne Fraser, Dave Kelly, & Graham Hickling
(Workshop Convenors), October 1992

INTECOL CONFERENCE, MANCHESTER, 22-26 AUGUST 1994

I attended the VI International Congress of Ecology in Manchester in August. I am grateful for the support of the New Zealand Royal Society, Otago University, and the Federation of University Women which allowed me to attend the Conference.

The main theme of the conference was progress o meet the challenge of environmental change. The Conference was opened on Sunday night with an inspiring address by Professor John Lawton who spoke about the importance of understanding ecosystems. He cautioned ecologists to look at 'the big picture' and not focus on individual species, and to consider ecosystems models as a tool for studying ecosystems. Three thematic symposiums were held, with papers presented by some excellent speakers. Professor Jane Menken gave a very interesting lecture on human population growth –a concept also discussed by many other speakers at the conference. Professor Robert May spoke with some provocative comments on human population growth. He cautioned that understanding biological processes that produce species population levels should be the focus of study rather than rarity and abundance. He reiterated the general theme that human population growth is very important and ecology is a 'footnote' only. Dr Tolba from UNEP, concluded his speech with some 'positives': there is an understanding by development agencies of the importance of the environment; international agreement has been reached on some global problems, CO_2 levels and CITES for example; science has shown that habitats can be rehabilitated; and we have and improved understanding of the environment especially with modern techniques in computers and communication. He concluded by saying that he believed that the world has a sustainable future.

The scale of the event meant that it was impossible to attend all sessions –there were 15 concurrent sessions for five days and over 2000 delegates so I concentrated on the Silver Jubilee of the Statistical Ecology Association. This was opened by G P Patil with an award ceremony for 15 distinguished statistical ecologists. P Greig-Smith, in receiving his award reminded us of the importance of communica-

tion between ecologists and statisticians. Robert May picked up on comments by G P Patil on future trends in ecological statistics with maps, GIS, and computers and the challenge to integrate space age techniques with experimental and theoretical science. Bryan Manly talked about his personal experiences in moving into statistical ecology 25 years ago. He was concerned that it was a bold move, but now has no doubts that it was the right move.

I found the Conference very worthwhile, my paper on my thesis research generated a lot of discussion and interest and I developed some interesting ideas on future directions for my research. It was a very good opportunity to make contact with fellow ecological statisticians and to meet with some of the authors of key ecology texts and papers.

Jenny Brown, Otago University

BIOLOGICAL DIVERSITY IN EXOTIC CONIFER PLANTATIONS

Exotic conifer plantations are established to produce timber. However, recent developments in the United Kingdom and North America have concentrated on the idea of multi-use forests whereby conifer plantations have now become an integral part of forest policy in several countries including the United Kingdom, USA and Canada.

In the United Kingdom a contract research project was undertaken by Ian Spellerberg and John Sawyer (previously at the University of Southampton, UK), funded by the Forestry Commission (UK) to look at ways of increasing levels of biodiversity in exotic conifer plantations without compromising an economic timber production enterprise[1].

As a result of this contract a bibliographic database was established to:

1. Bring together research papers that examine ways of restoring, maintaining and increasing levels of biodiversity in exotic conifer plantations in temperate regions;
2. Explore ways of developing standards for biodiversity.

This database now has over 700 references from around the world. We feel it is important to maintain this database and to make certain that all past and current research on managing conifer plantations to maintain or restore biodiversity are recorded on it. Therefore we are interested to hear of any innovative approaches to managing exotic conifer plantations for wildlife of which members of the Ecological Society of New Zealand may be aware. These approaches may be documented in research papers or reports or may simply be examples of conifer plantation management that embrace the maintenance of biodiversity as an objective.

It is hoped that in the near future the database will be online to service research enquiries about biodiversity in exotic conifer plantations using selected database keywords.

Articles or reports (or references to these articles) may be sent to the Database Manager, Biodiversity in Exotic Conifer Plantations c/o Dr I F Spellerberg, Centre for Resource Management, P O Box 56, Lincoln University, Canterbury, New Zealand.

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[1] I F Spellerberg and J W D Sawyer (1993). *Biodiversity in Plantation Forests.* A report to the Forestry Authority, (UK), 231 Corstophine Road, Edinburgh, EH12 7AT

A SELECTION OF ABSTRACTS FROM NZ ECOLOGICAL SOCIETY CONFERENCE, HOKITIKA, 1994

Removing The "Stain" From Sustainable.

Doug Betts
Environmental Manager,
Macraes Mining Company Ltd.

This paper is a general and philosophical note drawing on my past life as an environmental assessor of mining proposals and, before that, as an exploration geologist.

How should **we** use the word sustainable? Dictionary definitions create confusion, particularly in the context of this conference topic; the term has become a "buzzword". I will pose a couple of definitions and ask if **any** human activities really qualify. Examples will be drawn from farming, forestry, and tourism to see how well they fit the definition.

We mustn't allow this concept of sustainability to create notions of good and bad industries, when these industries are there to support the lifestyles we seek to maintain. All activities have the potential to be good or bad. However miners and all other industries need to embrace the **principles** of sustainability.

I will look at this in the context of the activities of the mining industry and compare current vs. former mining practises. The following will also be addressed:

- Prescriptions for mines ought to be tailored to the specific situation surrounding each mine proposal.
- Baseline monitoring is very important and can

be a valuable stand-alone contribution to the ecological inventory of the area.

- The expectation that land be returned as closely as possible to the state it was in prior to mining.
- Softening lines of mined areas by sensitive landscaping and planting.
- Ensuring that the area influenced by mining activities is minimised.
- Minimising the risk of pollution from discharges.

We need to raise the level of environmental awareness of all mine employees, and seek improvements to practises from the bottom-up as well as the top-down. We must also consider what happens to the mined product, and ensure that we, the public, let manufacturers know what we want from them and what is not acceptable.

Our individual responsibility is to re-use, repair, and recycle as much as we can. Manufacturers are getting the message and changing their ways in response to consumer demands for more environmentally friendly products. We need to extend these practises and principles across the whole spectrum of human endeavour.

An Historical Overview Of Sustainable Use Of Natural Resources Of Te Tai Poutini/The West Coast.

Peter Allan
Allan Associates Consultancy, Recognised Forestry Consultants

The approach taken by government departments during the period from 1960 to 1986 to sustainable use of natural resources of Te Tai Poutini/The West Coast is reviewed. This overview gives particular emphasis to use of forest land.

Hydro-Electricity And The Sustainable Use Of Available Resources In The West Coast Region.

Ian Lees
Westpower Ltd

This paper gives an overview of Westpower's past and present activities, and some future proposals regarding the production of Energy using the hydro-electric process. This section also discusses the type, size, and location of existing installations.

Current energy demand and improvements in the economy suggest demand will increase and therefore plans must be made to allow for continued growth. These are briefly outlined, as are energy conservation and efficiency promotions which Westpower has had in place for some time.

The paper outlines Westpower's perspective in terms of the sensible use of the hydro resource and discusses experiences with hydro to date, including the impact of the Resource Management Act 1991.

Finally, plans for the future are outlined and a brief overview is given of the proposed Taipo Hydro scheme.

Searching For Sustainability: Environmental Panaceas While Rome Burns.

Kit Richards
Timberlands West Coast Ltd.

As a company, Timberlands West Coast has been involved in one of the most visibly unsustainable land use activities still practised in New Zealand.

Yet, it was created specifically to attempt a fundamental reversal of one and a half centuries of Anglo-Saxon / agrarian attitudes to land use, a task which it is part way through and has to date achieved with some success.

Despite these progressions, contemplation about the direction and tenor of popular environmental debate leads one to fear that as a nation we have some way to go before we graduate from an era of environmental awareness to one of environmental understanding. In the interim Rome will continue to burn.

Use Of Quality Information In Land Use Decision Making –An Endangered Species?

Henk Stengs
West Coast Regional Council

An hypothesis explaining the cause of continuing conservation conflicts on the West Coast is advanced. It is argued that the cause is not necessarily a reaction by people to types of decisions made on land use issues, but to the process followed and the quality of ecological and economic information used. Three examples of land use decisions that were influenced by deficient information are described. Because the public are aware that such problems exist the cause of conservation on the West Coast continues to be frustrated. Whilst no review of past decisions is sought, a number of changes in the decision making process are called for to rectify this problem.

An Industry View Of Sphagnum Moss

Kees van Beek,
Sphagnum Moss Industry Association

The harvesting of sphagnum moss (based largely on *Sphagnum cristatum*) in New Zealand for export began in the late 1970's, with the demand to harvest the resource increasing rapidly since 1983. In 1993 export receipts were in the order of $18 million. Of the estimated 600 people involved in the industry in New Zealand, the majority operate in the West Coast.

In the West Coast the moss is generally harvested from lowland forests that have been cut-over, grazed areas, regularly burnt wetlands, abandoned mine sites, and previously harvested areas. The West Coast has a resource of some thousands of hectares.

This paper examines the sphagnum moss industry on the West Coast. Note will be given to moss ecology and the species present here. It will also look at the uses, markets, and market returns for sphagnum, and the industry structure and production cycle. The future of this bastion of private enterprise will be assessed in view of the sustainability of the resource.

Sustainability And Ecology: The Challenge Of The "Real World".

Caroline Mason
Landcorp Property Ltd
PO Box 142
Christchurch

"Sustainability" and "sustainable management" are familiar phrases which are now used in a variety of frameworks and contexts. These range from legislation (e.g., Resource Management Act) to policy (e.g., MAF Sustainable Agriculture Policy) and research (e.g., proposed National Strategy on Sustainable Land Management).

The concept of "sustainability" is of particular interest to ecologists, since this concept has the potential to embody many ecological principles. Ecologists can, and should, have a valuable contribution to make to the development of this concept of sustainability. However it is often the case that decisions made regarding the sustainability of resource use fail to adequately take account of "ecological issues".

In this paper I will explore, by way of example, some of the practical issues and dilemmas facing those of us who work as consultants in situations where ecological issues are not well understood or acknowledged. Some suggestions as to how these issues can be resolved will be discussed.

Impact Of Cattle On Forest Margins In South Westland

Timmins, S.M[1]., Buxton, R.P[2]., Wardle, P[2].
[1] Science & Research,
Department of Conservation, Wellington.
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To provide information on the impact of stock on forest margins in South Westland, seven pairs of matched exclosure and control plots have been placed across forest-grassland boundaries on river flats. They were set up in late summer, the first in 1989 and the last in 1992. Full resurvey of plots on deep alluvial silt in the Waitangitaona Valley was carried out after three years, and of plots on swampy ground in the lower Cook Valley after four years.

Responses so far to exclusion of grazing vary in rapidity, direction, and according to vegetation type. Some categories of native plants benefit, notably herbaceous species of the forest understorey. Others are disadvantaged by increased competition from more vigorous plants, the prime example being the almost total suppression of small native grassland species by vigorous adventives, especially *Lotus pedunculatus* and *Ranunculus repens*. For yet others, including the dominant tree species, it is too early to judge.

The project highlights three management principles. Firstly, each ecological situation should be judged and managed on its individual merits. Secondly, decisions concerning grazing should be based on clear statements of purpose; for instance, an emphasis on species diversity may require a management regime different from that needed to retain a forest canopy. Finally, monitoring projects are likely to yield new information for decades, and management strategies should be flexible enough to be modified as this information comes in.

The East Coast Forestry Project: Sustainable Resource Use Or Ecological Nightmare?

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This paper will discuss the East Coast Forestry Project and previous government schemes for afforestation in the East Coast region. It is developed within a framework of Ecologically Sustainable Development and a resulting definition and criteria for sustainable land management in the region.

The East Coast Forestry Project was announced in 1992 as a central government intervention through a tendered subsidy process to private investors and landholders (often in partnership). It aims to afforest 2000 km^2 over 28 years, thereby achieving soil conservation and employment goals through the creation of a large industrial forest resource. Targeting mechanisms designed to these ends have been controversial, particularly in the inclusion of some blocks of regenerating indigenous scrub in areas eligible for subsidy.

The East Coast Forestry Project is only the most recent of a number of proposed or implemented schemes of government intervention in the region aimed at land stabilisation and more sustainable land use patterns. A comparison of these schemes and their successes and failures shows some interesting similarities and differences, and may also provide

some pointers to possible outcomes of the present project. What is already clear is that serious analysis of options for sustainable land management needs to go a long way beyond single issues such as scrub clearance.

The Vegetation Of Flat Top Hill, A New Reserve In Central Otago, New Zealand

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An account is given of the vegetation of Flat Top Hill, an elongated foothill of the Old Man Range, in Central Otago, New Zealand. The area was acquired for conservation in 1992, following almost 150 years of pastoral use. Stock (sheep, Ovis aries) have been removed and rabbits (Oryctolagus cuniculus) have been controlled. The study provides a baseline for future monitoring of the reserve.

The vegetation was sampled using a composite scheme, designed to include the majority of habitats and communities present. Permanent monitoring sites were established using a restricted randomised design in a main "belt" transect that included the complete range of altitudes and aspects, in a subsidiary transect along the crest, and in additional habitats and communities of special interest. Quantitative vegetation data were collected in autumn, spring and summer to examine seasonal variation. Twenty three environmental factors were measured in each sample.

Native species comprise 53% of the known vascular flora of the area (211 species). From multivariate analyses of the data from all three seasons, four 'formations' were recognised, and fourteen 'communities' described within them. Four 'variants' were recognised within the six most extensive communities. Although there were few constant or faithful species, strong relationships were shown with the environment, particularly with aspect, slope, soil moisture, soil depth and soil texture. Communities differed significantly in total and native species richness, dominance and diversity. Analyses also showed a gradient in vegetation from sheltered rock tor habitats to open, disturbed sites. Weak community structure was found, which may be due to year-to-year environmental variation or to lack of equilibrium.

It was concluded that the summer survey may be a poor baseline for future monitoring, due to unusually high summer rainfall. Although many species showed significant differences in abundance between sampling times, seasonal changes in the vegetation were insignificant compared to spatial variation. The vegetation had slightly weaker structure in spring than in other seasons, and was less strongly correlated then with factors related to soil moisture.

All but one site/season sample comprised both native and exotic species. Native and exotic guilds are poorly integrated and show considerable ecological differentiation. The highest proportion of exotic species is found where soil moisture, depth and fertility are greater. The distribution of native species is more determinate than that of the exotic guild, but less strongly related to the present environment. Variation in the total vegetation is better correlated with the exotic than with the native guild, suggesting that the exotic guild determines the structure of the overall vegetation.

Ecophysiology Of Successional Plants In South Westland

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Eight distinct sites were selected from a previous study of plant succession and pedogenesis at Franz Josef Glacier by Stevens (1963; 1968). Plant species, diversity and abundance were recorded on the three youngest sites, aged 45 to 84 years in the study. Floristic composition was compared to composition recorded on the same sites 30 years previously. Sites in the present study were also compared to sites that were of equivalent age in the previous study. Floristic composition did not appear to occur in a predictable manner, due to a dynamically changing understorey.

Soil N levels were determined on all eight successional sites. Total soil N increased over time, with initially rapid rates of accumulation declining with progress of succession. The pattern of accumulation observed in the present study was the same as that noted by Stevens (1963), confirming that N is increasing during early succession and pedogenesis.

Total leaf N was determined for species *Griselinia littoralis, Pseudopanax colensoi* and *Coprosma lucida*, on each site. Leaf N (mg/g) was highly variable, exhibiting no clear trends. Leaf N per unit leaf area (mg/cm^2) declined with increasing surface age and increasing specific leaf area (SLA). Leaf N did not correlate with soil N. This may be due to soil N availability levels declining, with increasing C/N ratios, associated with succession, or the inability of these species to utilise higher N.

Chlorophyll levels and SLA were determined for the same three species, on the youngest and oldest sites of the successional sequence. An increase in SLA and total chlorophyll per weight (mg/g) and a decline in the chlorophyll a:b ratio suggests evidence of shade acclimation in these species.

Growth responses to applied NO_3 were recorded in *Carmichaelia grandiflora* and possibly in *Aristotelia serrata*, both of which had significant

responses in NRA to applied NO_3. *C. arborea* and *Olearia avicenniaefolia* dry weight was not affected by applied NO_3, which can be related to no effect of applied NO_3 concentrations on total NRA. *C. grandiflora* was found to have high NRA up to 2.2 mMol gfw^{1} h^{1} of which over 50% was carried out in the leaves. *A. serrata* had NRA dominant in the leaves (>70%) which can be related to cold tolerance and growth in high PFD situations. Detectable tissue NO_3 is related to the total NRA of the plant and NRA partitioning.

These initial findings may contribute to the increasing explanatory power of measurements of indigenous plant successional strategies.

Key words

Griselinia littoralis; Pseudopanax colensoi; Coprosma lucida; Carmichaelia grandiflora; Aristotelia serrata; Coriaria arborea; Olearia avicenniaefolia; pedogenesis; succession; floristic composition; predictability; shade acclimation; nitrogen response; nitrate reductase; tissue nitrate; NO_3-N.

Topographic Roughness And The Persistence Of Native Plants In Extensively Modified Landscapes, Central Otago.

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The range and basin landscapes of Central Otago have been extensively transformed by sheep and rabbits, and fire. They are currently characterised by patchy and depleted ensembles of native and introduced plant species, with many native plants occurring at very low cover-abundance values.

The persistence of native plants considered vulnerable to grazing or which are dependent on mesic conditions was investigated in low altitude, midslope sites west of Alexandra. The vegetation cover ranged from modified short tussock grassland with scattered woody shrubs, to herbfields of introduced herbs, scabweed and bare soil. The sites investigated were characterised by rock outcrops and isolated rocky piles of varying dimensions. The role of outcrops as fine-scale refugia for woody, grass and broadleaf herb species, and the reflection of their extent on the floristic diversity and frequency of native fern species was examined.

In a narrowly ecological sense, the current low rainfall landscapes of Central Otago represent an environment in which native plants merely survive. The conservation value of landscape elements and the pace of native plant recovery, should grazing and burning pressure cease or be reduced, are likely to bear some relation to surface roughness. The latter increases landscape 'packing' and edge habitats, and provides shelter from desiccating winds. Topographic roughness at a local scale will give rise to greater landscape potential in terms of maintaining a 'place' for native plants in the area's changing landscapes.

Seasonal Movements Of Female New Zealand Fur Seals (*Arctocephalus forsteri*) At Cape Foulwind

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Fifteen adult, presumed breeding, female fur seals were caught and radio tagged at Cape Foulwind, near Westport on the West Coast of the South Island. The Cape Foulwind colony was chosen primarily due to its proximity to the Hoki fisheries where each year a number of seals are caught. Female fur seals of breeding age which are caught in this fishery are most likely to breed in the Cape Foulwind colony. The aim of this study was to document the frequency, duration, and distance that females travel from the colony.

The seals were tagged with 2 stage VHF transmitters that had a range of at least 100km and a life of up to 10 months. Four tracking periods were chosen to coincide with important times during the year: April, following moulting; July, the Hoki fishing season; November, preparturation; and January, postparturation. Results from the first tracking session showed that the seals mostly travelled south of the colony. The furthest a seal was recorded out to sea was 62km, while the furthest location for a seal south of the colony was 35km. Fewer positions were determined in the second tracking period, however most were north of the colony. Although fewer triangulated bearings were determined in the second tracking period, signals were received from most of the transmitters. Tracking in the third and fourth tracking periods was less successful due to the limits of receiving equipment, transmitter loss, and transmitter damage.

Maternal Effort Of New Zealand Fur Seals, *Arctocephalus forsteri*, At Cape Foulwind, New Zealand.

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This study investigated maternal effort of New Zealand fur seals, *Arctocephalus forsteri*, at Cape Foulwind, New Zealand by measuring pup weights, maternal attendance patterns, and suckling behaviours.

Male pups were heavier and grew faster than female pups from 60 to 200 days old, although their

relative dimorphism did not increase significantly over that period.

Maternal attendance changed significantly throughout lactation. The time mothers spent ashore suckling their pup decreased significantly from 1.7 days in February to 1.2 in July per 8 days of observation. Intersexual differences in maternal attendance was significant only in February, with mothers of female pups spending 1.8 days ashore per 8 days observation, compared to those with male pups spending only 1.5 days ashore. Pups were responsible for terminating 82% of suckling bouts, with no intersexual difference shown.

Mean suckling bout length was the only suckling behaviour which showed significant differences between pup sex over the six month study, with males having longer suckling bouts than females. Suckling bouts were significantly longer for male pups (32 mins) than female pups (23 mins) in May and there was a strong trend for males to suckle more minutes per hour (39 mins/hour) than females (35 mins/hour).

Keywords
Arctocephalus forsteri, New Zealand fur seal, maternal effort, maternal investment, sexual dimorphism, pup growth, Cape Foulwind.

Population Size And Breeding Status Of New Zealand Fur Seals (*Arctocephalus forsteri*) In The Nelson-Northern Marlborough Region.

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Landcare Research Ltd, Nelson.

New Zealand fur seal populations in the Nelson-Northern Marlborough region are expanding rapidly both in numbers and breeding range, and similar population increases have been reported from elsewhere in New Zealand and Australia.

Results show that fur seals now breed at four rookeries along the southern shores of Cook Straight; at Archway Islands and Pillar Point, near Cape Farewell; at Tonga Island in Tasman Bay; and at Stephens Island in the outer Marlborough Sounds. All are relatively new breeding rookeries –established in about 1980, 1988, 1988, and 1970 respectively.

In 1993/94, a total of about 548 pups were born at these rookeries, and the population of seals directly associated with them was assessed at 2695. There were also 15 hauling grounds, each with 25 or more seals ashore in winter, and about 30 sites where lesser numbers regularly hauled out.

A comparison with earlier estimates indicates that the summer population has increased from about 70 in 1973 to over 2500 today. The number of pups produced has increased at an annual rate of 24% since 1970.

It has been suggested that the apparent increases may be due to a redistribution of an otherwise stable New Zealand fur seal population. We have seen no evidence for this, and consider it highly unlikely. A nation-wide census of New Zealand fur seals would clarify their present status, and its initiation is supported.

Results Of The Translocations Of Hihi (Stitchbirds, *Notiomystis cincta*) To Kapiti Island In 1991 And 1992.

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Little Barrier Island, New Zealand, currently supports the only self-sustaining population of hihi (*Notiomystis cincta*). The New Zealand Department of Conservation is trying to establish populations of this species elsewhere to ensure its survival. In 1991 and 1992 hihi transfers to Kapiti Island were approached in an experimental way. In 1991, four release strategies were tested: immediate, delayed, paired and grouped releases. In 1992, the effect of the presence or absence of conspecifics was tested. Comparison of the different strategies based on bird sightings and movements during the first 4 weeks after release supported four main conclusions: (1) immediate-release birds survived better and travelled over a greater area than delayed-release birds; (2) there was no difference between the survival of birds released in pairs or as a group; (3) hihi released in the absence of resident conspecifics survived better than those released in their presence (not statistically significant); and (4) birds released in the absence of resident conspecifics appeared in an area with residents about three days after being released. The breeding and feeding behaviour of hihi differ between their source population on Little Barrier Island and Kapiti Island, where they have been transferred. In contrast to Little Barrier Island the hihi on Kapiti Island use artificial feeders during spring and adopt a variety of polygamous mating systems. The change in behaviour reflects both environmental differences between the islands and the ability of the species to adapt to a new environment. Although Kapiti may be a suboptimal habitat for hihi, the behavioral plasticity of the species could be used, in combination with habitat management, to establish a population on Kapiti.

Recreational Thar Hunters And Thar In Carneys Creek: The Riddle Solved?

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Despite being very popular with recreational hunters, thar in Carneys Creek have steadily increased since annual summer counts began in 1984. However, since 1990 the proportion of male thar has increased while the total female population has declined significantly. A comprehensive survey of hunters in 1993 revealed that >100% of males counted in March 1993 were shot. Hunter success was positively correlated with the number of male thar observed in counts during March, August, and December 1993. These two independent measures confirm that thar are increasing in Carneys Creek because greater numbers of males born elsewhere are using Carneys Creek as summer habitat. During winter thar in Carneys Creek are well below the intervention density defined in the Himalayan Thar Control Plan. Interpreting summer thar counts from catchments being monitored by the Department of Conservation requires careful consideration of the male:female ratio.

Options To Integrate The Management Of Mammal Pests Of Conservation Values

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The Department of Conservation spends *c.* $12 million/year controlling some of the worst of the 31 exotic mammal species living in the wild in New Zealand. Very few species and populations are actively managed to protect natural resources, partly as a result of rational choice (some species are worse pests than others), partly because it is expedient (the species is unwanted by anyone) and partly because of history (it has been controlled in the past).

There is a general belief that the conservation benefits would increase if more species were controlled and if the management of those that were controlled was better integrated. We wish to explore some options to do this, particularly on the mainland where pests cannot be easily eradicated.

Three general planning systems are discussed: the present "worst pest - priority place" model, a "priority place - critical pest" model, and the habitat island or " priority place - all pest" model. The first allows lots of places to be protected from *bette noire* pests. The second is untested but may allow better protection at fewer places. The last allows very few places to be given maximum protection, but will have large opportunity costs. We favour (on no strong evidence) a move from the present system towards the second system in a way that will not lose the substantial benefits gained to date.

The process to do this depends on identification of the relative overall pestiness of the species and of which species are critical pests in each place, i.e., the first level of integration is by comparing impacts. Data comparing the impacts of ungulates and possums in forests will be presented.

Secondary levels of integration consider strategic options (which depend on pest patchiness, likelihood of reinvasion, and so of eradication), tactical (can several pests be killed with one technique), logistic (can budgets be sustained), and social factors (who benefits especially when some species are simultaneously pests and resources).

Bait Shyness In Possums

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A better understanding of the behavioural mechanisms involved in poison and bait rejection will lead to the development of more effective poison control strategies. In a series of experiments it has been shown that both learned and unlearned behavioural mechanisms are involved in avoidance of poisonous baits. About 20-25% of possums reject poison at first exposure and some individuals also show a neophobic response to the novel food or bait (unlearned mechanisms). The predominant learned mechanism is Conditioned Food Aversions, where baits are rejected on subsequent exposure following consumption of sublethal doses of poison. Aversions were conditioned in three experiments using i.p. or oral routes of administration with three different cyanide formulations over a range of doses. Across all experiments there was a direct relationship between dose and the proportion of animals developing aversions. When administered orally, doses greater than 5 mg/kg resulted in more than 50% of animals developing aversions.

Possums also developed learned aversions to 1080 and this shyness lasts at least as long as 12 months for both poisons. In possum management it must be remembered that although ingestion of the highest possible poison dose is more likely to ensure death, any survivors from such a poisoning operation are also increasingly likely to be bait or poison shy for some time.

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