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EDITORIAL

What's selling well?

Science publishing has a small specialised target audience, so sales in large numbers are not usual. A distribution of two hundred and fifty is a big one for us. Two books have recently confounded that trend, one is actually selling rapidly and the other steadily.

Managing Riparian Zones: A contribution to protecting New Zealands rivers and streams. Vol 1: Concepts and Vol 2: Guidelines, has, as a set, been distributed to more than six hundred locations. One of the best indications of its popularity is that we have sold second and even third sets to individuals, to replace copies which have 'gone missing' after a meeting or hearing. Congratulations to the authors at NIWA including former staff member Kevin Collier, for producing so popular and useful a set.

The other text, whose durability and excellence continues to create new audiences is *Ecological Restoration of New Zealand Islands*, which has been selling at a regular 80–100 copies for the past five years; and shows no signs of diminishing attraction. "Islands" is currently the only text on restoration for both 7th form and University students.

Of lesser numbers, but still an enduring staple amongst our publications, is Cunningham and Moors *Guide to the identification and collection of New Zealand rodents.* First published by the Wildlife Service in 1983, in a handy A5 size, it is now going into the 3rd edition. People have never ceased to find it useful. The new edition will be available in May — put your name down for a copy now.

K. Green
Editor

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Conservation Science Newsletter is issued six times per year in February, April, June, August, October, and December. Contributions should reach the Editor, Science Publications, Science and Research Division, Department of Conservation, P.O. Box 10-420, Wellington, by the 1st of the month in which they are to appear.

Department of Conservation
Te Papa Atawhai

Taking a Broader View

Philip Simpson attended the *Society for Ecological Restoration International Conference, University of Washington, Seattle, Washington, (U.S.A.), 14-16 September, 1995.*

I very much wanted to attend this conference, as I have, over the past year, been working almost exclusively on ecological restoration policy and planning, including my work for Project Crimson. Project Crimson very generously funded my trip to the Conference...
Philip Simpson

Ecological restoration is quite a new discipline in New Zealand and overseas. It is based on an understanding that just maintaining what we have left now of natural ecosystems is not adequate or, indeed, possible, as decline will continue, and that improvement through a range or restoration actions is needed.

My interest in attending the conference was, therefore, to see how approaches being taken in New Zealand compare with those overseas, and to further develop DoC's interest in ecological restoration. I was particularly keen to meet the people involved and to initiate an international network that can have on-going input into restoration philosophy as it unfolds in New Zealand. My expectations were well met.

Attendance

Approximately 1000 people attended, most from the western USA and Canada. SER originated as an American Society, but it has recognised that interest is so widespread that regional groups of countries have been formally identified. New Zealand is part of Pacific-Eastern Hemisphere region, and is represented on the SER Board by Dr Ian Perkins, P.O. Box 134, Annandale, New South Wales, Australia.

Conference theme — "Taking a broader view"

The title of the conference reflects interest in opening the doors of ecological restoration to the full spectrum of its coverage. There was a very wide range of professions represented at the conference, with a significant component dealing with cultural aspirations. Ecological restoration was often set in a context of **ecosystem management** which in turn is a developing model for sustaining natural resources **and** cultures.

Ecological restoration can be seen, therefore, as a tool for implementing the international agreements defined, for example, in the Convention on Biological Diversity.

The "broader view" was also described in physical terms. The mountainous coastal zone of the N.E. Pacific has been defined in biogeographic terms as "Cascadia". The restoration of Cascadia was frequently mentioned as a "local" goal, dealing not only with ecosystems but landscapes, resources and, above all, cultures. Bioregional thinking, involving people seeing their relationship to nature **in a particular place**, was a prevailing theme through the conference.

The "broader view" was also in the large number of trades stalls. While I was unable to take them all in, I visited stalls on mycorrhiza, indigenous plants, techniques of establishing plants on difficult surfaces, (fibre mats, tree protection devices) and so on.

A feature of the participants was the large number of consulting companies involved in restoration. There is no shortage of technical expertise for the restoration of a comprehensive range of ecosystems.

Plenary Sessions

The whole conference heard presentations from influential speakers at international, national or local levels. These speakers all emphasised the need to incorporate people and com-

munities, and particularly indigenous cultures, into ecological restoration projects. This was defined by one speaker as "eco-cultural restoration". Some of the specific ideas advanced included:

1. Our view of nature is culturally based, and that the predominant western view is that nature is outside people — stable and perfect, when in fact nature is dynamic, people are part of nature, and the more correct paradigm is the "flux of nature".
2. We need to take a more spiritual approach to things — a "restoration of attitude". Reafforestation projects should, for example, support the health of the local community, as well as supplying a resource for the timber industry; and maybe we should consider not going to some wild places, to protect their mystery.

Symposium: "The role of restoration in ecosystem management"

I attended as many sessions as I could on this subject, which was a testing ground for much of the ecological theory and principle that Ecological Restoration is based on.

Reed Noss (Oregon State University), one of the leaders in the field, outlined a number of principles such as restoring viable populations of all native species, throughout their range; restoring large areas by passive processes; understanding impacts of fragmentation on particular species, and understanding species interrelationships (often forgotten by a single species approach); maintaining ecological and evolutionary processes by understanding and restoring disturbance regimes.

Thomas Parker (San Francisco State University) advocated the "flux of nature" hypothesis because this enabled multiple end points in restoration, recognised external regulatory processes, including disturbance and, most importantly incorporated human influences and gave a role for people. He recognised that a hard concept for the public was the need to restore processes, not particular communities of species.

Dennis Martinez (Traditional Knowledge Council, Eagle Point, Oregon), contributed to the symposium by referring to the SER definition: "ecological restoration is the intentional renewal of ecosystem health". He reiterated his view, charismatically proclaimed elsewhere, that ecological restoration offers a way to reverse resource degradation for local people if it is designed to work at the local scale, with local people. I think that this philosophy contrasted significantly with European and American scientific approaches to restoration. They tend to emphasise planning and method as opposed to recognising the value of "intellectual ownership" of restoration projects by local people themselves. Bureaucracy also tends to prevent an "adaptive management" approach to ecosystem management.

International Symposium

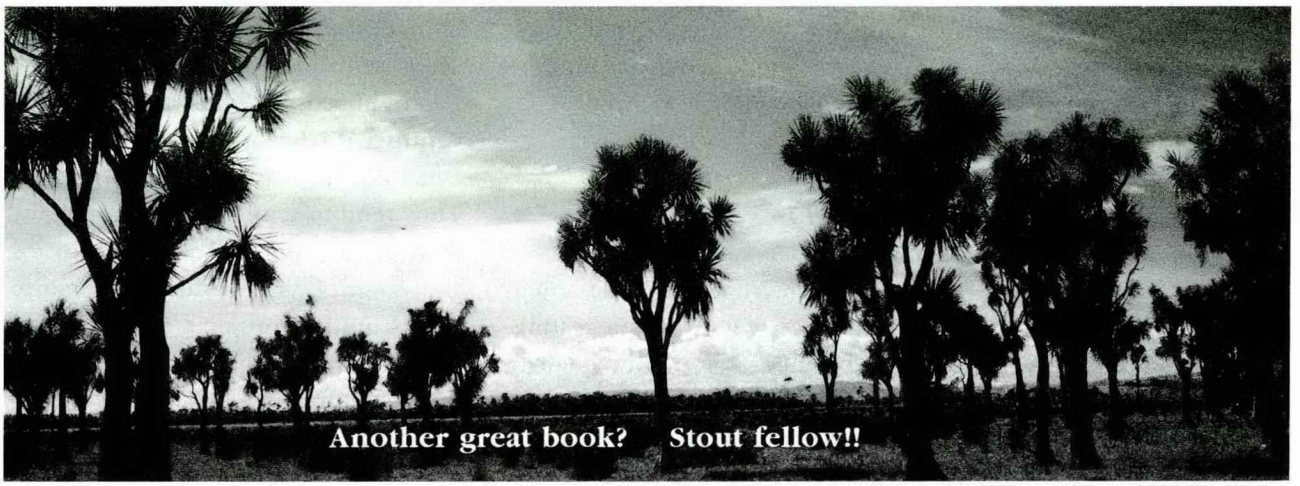
My paper was part of series on projects in different countries, and the context of community based projects in different cultures was excellent. Projects ins Costa Rica, England, Nepal and Tasmania were described in my session. All these projects aim to empower communities to improve ecological health and land productivity, through advice.

My paper, "A Department of Conservation perspective on Ecological Restoration in New Zealand" described New Zealand's overall ecological con-

text, commented on some of the reasons why restoration is needed, and some of the principles being developed. I related the importance of community based restoration projects to these principles and illustrated this using Project Crimson. Project Crimson, is, I concluded, a successful approach toward achieving the Department of Conservation's vision on ecological restoration, namely: "To restore mauri by bringing nature and culture together into a healthy indigenous environment through the conservation actions of people everywhere in New Zealand" Mauri is a concept meaning the "life principle" and roughly translates to ecological health and productivity.

The Trust has established several community based nursery projects. It assists Rotary N.Z. in their school based nursery growing units to train students in propagation. The New Zealand Crippled Children's Society maintains a nursery training facility which produces pohutukawa seedlings. Paremoremo Prison also maintains a nursery and has become a major provider of seedlings to disperse to community groups. Other prisons are following suit. These are innovative ways of reducing the cost of restoration, of training, and advocacy.

NOTES AND NEWS



Philip Simpson has been awarded a Stout Research Fellowship. He will be away from Tory Street, officially, for a year — but he drops in from time to time!

The book-writing angel tapped me on the shoulder the other day and said, "Get thee to the Stout Research Centre up the hill and write a book on the Cultural and Natural History of the Cabbage Trees." I obeyed.

The man on the hill said: "We gave you this fellowship because there is a cabbage tree behind every one of us." "In that case" I said, "I will write a book on how the cabbage tree got its leaves." I will leave immediately for Gondwanaland and talk with the ancestors. I will get permission to describe how the gifts of the Miocene have been loaned to the people of the Pacific, for eating, weaving, clothing, building, and playing.

I will talk with the artists to find out what's right. I will talk with the pathologists and ecologists to find out what's wrong. I will encourage the children to plant cabbage trees for the farmers, and I will dare the politicians to buy fences!

The angel said "I want a beautiful book for the lounge. One that helps return the gifts that cabbage trees gave." "O.K." I said, "I'll see you next year." — *Philip Simpson*

RESEARCH IN PROGRESS

Stoats: Recent research and management — Part 2

Stoats were introduced to New Zealand from England in the 1880s to control rabbits but rapidly became implicated in the decline of native bird species. Stoats are now widely distributed in both the North and South Islands of New Zealand and are one of the commonest predators in forests.

Elaine Murphy (Science and Research Division, Auckland) specialises in predator biology. In part 2 of her report, she covers research on stoat control, current student research, and DoC plans for the current financial year.

Recent research on control of stoats

Development of a long-life toxic bait and lures for stoats

Eric Spurr (Landcare Research, Lincoln - funded by DoC S&R)

Trialled 43 potential baits and 17 scents. Stoats in captivity ate dead rats, mice, and day-old chicks more readily than hen eggs but eggs are more convenient to use in the field. Research has not yet identified any longer-lasting baits that stoats will eat readily.

Control of stoats using 1080 in hen eggs was investigated in pen and field trials. Efficacy of 1080 in hen eggs was field-tested against stoats at Craigieburn and achieved a 90% reduction. A similar level of stoat control was achieved using diphacinone in hen eggs the following year.

Secondary poisoning of predators — open areas

Nic Alterio (Ecosystem consultants)

Demonstrated that stoats (& other predators) could be killed indirectly by poisoning their preferred prey with brodifacoum, an anti-coagulant poison on the Otago Peninsula. Predators of hoiho are currently controlled by trapping, but this is labour intensive, expensive and only partly effective.

Nic will be trialling the effectiveness of secondary poisoning at controlling stoats in beech forest on the West Coast this summer.

Secondary poisoning of predators — forested areas

Elaine Murphy & Phil Bradfield (DoC)

Although secondary poisoning may be an effective method in more open areas where mammals are the main prey of stoats, it may not be so effective in forest where birds are an important component. At Mapara (forested reserve, 1400 ha), where brodifacoum was used in bait stations over two summers to control possums and rats, numbers of stoats caught in January were similar to numbers caught in years when brodifacoum wasn't used. However, fewer stoats were caught in November and December, and this may have been due to secondary poisoning. Of 40 stoats analysed (caught throughout the year) 75% had brodifacoum in their livers but not at lethal doses. More work needs to be done to sort out the role of secondary poisoning in forests.

Sound lures for stoats

Ian Flux (DoC)

In conjunction with Murray Douglas (DoC), Ian has developed a sound lure using a sound chip which holds various signals (e.g. bird calls). Results to-date have been limited but trials are continuing in a number of areas.

North Island trapping trials

Hazel Speed & Elaine Murphy (DoC)

At Kaharoa (near Rotorua) no significant differences were found in the number of stoats killed in double ended and single entrance tunnels and baited and unbaited Fenn-traps. However, significantly more males were caught in unbaited traps than female stoats (and more females were caught in baited than unbaited traps). Live-trapping trials have also been un-

dertaken at Puketi Forest (Northland) using anal scent glands as lures, and wearing gloves whenever handling traps, but too few stoats were caught to obtain any meaningful results.

Recent student research on stoats

Diet and movements of carnivores around Yellow-eyed penguin breeding colonies. **Nic Alterio**, MSc 1994.

The prevalence of bovine tuberculosis infections in ferrets, stoats and feral cats in the Otago region. **Justine Ragg**, MSc.

Temporal and spatial patterns of predation of Yellow-eyed penguins by small mammals, and their control. **Hiltrun Ratz**, PhD thesis (not written yet).

Chris Rickard (Canterbury University) is currently doing a diet analysis on the stoats caught at Okarito (West Coast). He has identified the remains of a kiwi chick in one of the stoats stomachs.

A trapped and anaesthetised stoat being eartagged and fitted with a radio collar, by Elaine Murphy and Peter Dilks. Photo: Rod Hay

Richard Cuthbert (Otago University) will be starting a PhD next year on the ecology of Hutton's Shearwaters and stoats within the Kaikoura mountains.

Craig Gillies (Auckland University) is doing a PhD on the effectiveness of predator (stoats, ferrets & cats) control at Trounson Park, Northland.

Jonathon Miles (Massey University) as part of his MSc, analysed the diet and age of stoats caught in the Tongariro kiwi management area.

DoC research and management planned for 1995/96 financial year

Eglinton Valley, Fiordland: Effectiveness of 1080 poisoned hen eggs in protecting yellowheads in a stoat plague year (Peter Dilks & Colin O'Donnell)

Eglinton Valley: Effectiveness of 1080 poisoned hen eggs for controlling stoats, as determined by radiotracking (Elaine Murphy).

The Dart Valley (Otago), the *West Coast and Hurunui* (Canterbury) will all have trials with poisoned hen eggs as a means to control stoats.

The Landsborough (West Coast), the *Milford track, Hawdon Valley* (Arthurs Pass) and *Tongariro kiwi area* will all have kill-traps for stoats for management.

Hollyford Valley, Fiordland: Use of sound lures for attracting stoats into traps during a stoat plague year (Ian Flux).

Pureora Forest: Development and trials of trapping techniques in central North Island forest (Ian McFadden).

Northland: Two studies this breeding season using video surveillance to identify nest predators of New Zealand dotterels and fairy terns (Richard Parrish and John Dowding).

Measuring effects of goat control on forests

Where the conditions for successful eradication are met, eradication of goats is the preferred strategy. However, in many areas, the extreme wariness of survivors and the certainty of reinfestation mean sustained action must be planned to maintain the conservation benefits of control.

Feral goats occupy about 11% of New Zealand, but on the DoC estate they occupy about 25%. Government control has been ongoing since 1936, and the Department currently spends over $3 million per year to control goats over about half of the conservation estate occupied by the pests.

If eradication is not possible, how few goats should managers aim for? "As few as possible" is not an answer that imposes any accountability, and "as few as technically possible" is both financially costly (the last 1% can cost as much as the first 99%) and imposes opportunity costs by limiting the number of pest populations that can be controlled. The best, but most difficult answer to implement is "as few as is needed to protect the resource".

Three levels of complexity need to be considered if managers are to identify the level of goat control needed.

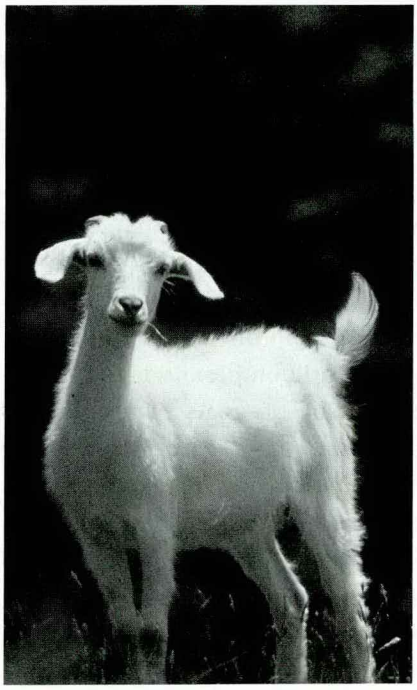
The first is that the relationships between herbivores and vegetation are not likely to be simple straight lines; some target density of pests must be reached before the resource benefits. Graham Nugent and his team at Landcare Research have shown that the impacts of deer in forests mean that the most palatable plants (such as broadleaf) do not regenerate in accessible areas until very low deer densities are reached, although less palatable species such as kamahi do regenerate at moderate deer densities. The explanation for this is that deer, and presumably goats, in forests live mostly off foliage that has fallen from the canopy. Goats have to be hungry before they will eat food off the ground, but quickly find and eat leaves off fallen trees and branches. This capital of inaccessible food buffers the herbivore-understorey relationship so that nothing more palatable than canopy vegetation regenerates until very low herbivore densities are reached. The buffer remains so long as the current canopy structure remains, but the whole system may collapse when the canopy dies of old age, storm damage, or possum browse.

The second complexity is that intensive control of goats (and perhaps other pests) may create patches with and without goats. The benefits are thus absolute in some places but variable in others, via the above buffered relationship.

The third complexity is that the habitat itself is patchy and will be responding to other factors that are independent of changes in goat numbers.

The search for a simple, inexpensive method to measure and interpret the complex processes involved with control of goats and their impacts has led Science and Research Division to fund a Landcare Research project to measure changes in forest ecosystems that occur in response to different goat control regimes. The team led by John Parkes and Bruce Burns has established a series of marked, paired 5 x 5 m plots located in canopy gaps and under adjacent forest canopies in forest blocks with and without goat control at Tawarau, Waitaanga, and Tennyson Inlet. Exclosures were also erected around a subset of plots at Tawarau. Basically, all vegetation was counted and measured in these plots to see what subset of measurements would be most sensitive to any changes in goat densities. The Tawarau plots were established in January 1993 and remeasured in December 1994. Changes in species richness (as

RESEARCH IN PROGRESS



a measure of diversity), number of woody seedlings (as a measure of abundance), number of seedlings of canopy species (as a measure of regeneration) and number of palatable seedlings (as a measure of a preferred subgroup) were assessed and compared. These early results showed small increases in woody seedling and canopy species seedling numbers caused by reductions in goat numbers by hunting. However, our over-riding conclusion is that the time between the two measurements was too short to reveal any highly significant changes.

These preliminary results did nevertheless suggest that counts of seedlings may be a useful performance measurement for goat control. Whether this will hold when the vegetation has had more time to respond to low goat numbers, or whether a simpler experimental design might be better remains to be seen. One suggestion for a simpler design is to monitor the heights of seedlings between 0.3 and 2 m tall, i.e., within the tier normally browsed by goats, on smaller permanent plots located along transects and score the canopy cover and accessibility to ungulates of each plot. We have recently begun monitoring the heights of tagged palatable seedlings located within our study plots at Tawarau and Waitaanga to investigate this.

John Parkes and Bruce Burns,
Landcare, 12 September 1995

BOOK OFFER

If you want a copy please send Kaye Green, DoC, Tory Street, an EMail registering your interest.

The Rockpool Fishes of New Zealand

Te ika aaria o Aotearoa

Special price to DoC staff: $30.00 incl. GST. **(usually $49.95)**

Over eighty species — illustrated in colour and line drawings.
Identification keys to all species.
Information on Common, Maori and Scientific names; Ecology, Life Histories, Biology and Distributions — including 80 maps.
Introductory chapters on Fish identification, Historical aspects, the Coastal Environment and Zoogeography; comprehensive Glossary.
Fully Referenced and Indexed. 177 pages, including 30 plates with 120 colour photographs, over 80 drawings.

This is the first comprehensive guide book to the most accessible fishes of New Zealand - fishes of the rocky shore. The narrow intertidal zone provides highly specialised habitats for over eighty species of fish, and nearly two-thirds of these are unique to New Zealand. Intertidal fishes are a spectacular and fascinating part of our fauna: however, many have been difficult to identify, and some have only been discovered and named recently! This publication provides detailed information on identification and distribution and a summary of the life history and biology of all intertidal fish species; it is the culmination of many years work by museum scientists and other researchers.

Each species is superbly illustrated by Helen Casey, with colour photographs of live specimens provided by renowned wildlife photographers Paddy Ryan and Malcolm Francis. Chris Paulin and Clive Roberts have called on the resources of the Museum of New Zealand *Te papa Tongarewa* to produce a book that will be invaluable to all who have an interest in the sea shore, including fishermen, scientists, students and amateur naturalists young and old.