CONservation SCIENCE newsletter

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CONTENTS

EDITORIAL

The layout in this issue comes to you courtesy of Bronwyn Millar who is a student journalist from the Wellington Polytech Journalism course.

Bronwyn is on a work experience placement with the Science Publications Unit and over the next few months you will see stories (we hope) about the work of the scientists appearing in other publications.

This issue of ConScience will be one of the last to appear in this size and format. The publications working group, part of the Corporate Identity project, has been looking at new publication designs for all publications including newsletter. Our new format will almost certainly be A4 size which while not the choice of field workers will give us more room to bring you science news.

Kaye Green

Department of Conservation
Te Papa Atawhai

REPORTING BACK

Susan Timmins reports on the conference: "Nature Conservation: The Role of Networks" held at Geraldton, Western Australia, 16-20 May, 1994

The Conference

The conference was sparked by a growing awareness that ecologists must devote part of their time to educating the public and participating in decisions, on nature conservation. Two hundred conservation biologists, ecologists, managers, landowners, and private citizens from 14 countries met to explore the themes that networks of people are our conservation force and networks of other organisms are our conservation resource. Ninety four oral and 25 poster papers were presented at the conference.

My Role

I chaired a session on Development and Maintenance of Networks.

I delivered a paper, "Community Groups and Weed Control", which was well received as New Zealand Department of Conservation is a leader in this area of endeavour. (The paper is filed on OST 0022 and will be published in 1995 in the conference proceedings).

I had a further chance to talk about DoC's volunteer programme during a live, magazine-style, 10 minute radio interview.

Two Comments

1. Biology and Social Science. While the conference was attended by a very diverse range of people, it nevertheless attracted a lot of ecologists talking about the involvement of people in their projects, be they community groups, other agencies, or other disciplines.

Many of the speakers clearly felt safer describing the where, when and what of their project and only flirted with people topics such as trust, volunteer psyche, power struggles, involvement of marginalised groups. This bunch of biologists recognised the importance of people to achieving conservation goals but did (do) not have the social scientific framework in which to place their experiences. Equally, those social scientists at the conference delivered the much needed basic theory and principles but did (do) not have the background biological knowledge needed to apply the principles to many of our conservation problems.

This is relevant to DoC with our Atawhai Ruamano vision rooted with people and our expenditure of 40% of our operational budget on recreation. The impact of people on natural ecosystems, the impact of biology on people, are generic topics which don't tend to be promoted in the department.

2. Empowering is an "in" word but the conference indeed gave status to the views of women, indigenous people, landowners (farmers), scientists, non scientists, and to part-timers with one foot in a government programme and one foot in the community. Giving people air time is a good start but the conference highlighted the need to use language and communication techniques appropriate to the audience otherwise communication fails.

The range of contributors at the conference also demonstrated the

wealth of knowledge and talent available in the community (or outside our own agency). Best to respect it and use it.

Conference Participants

COUNTRY BREAKDOWN

Australia
170 (Western Australia 101)

New Zealand	9
USA	5
Pakistan	2
United Kingdom	2
Tanzania	2
Costa Rica	2
Netherlands	2

Bangladesh, Indonesia, Egypt, Uganda, Germany Saudi Arabia, Phillipines, Zimbabwe 1 each

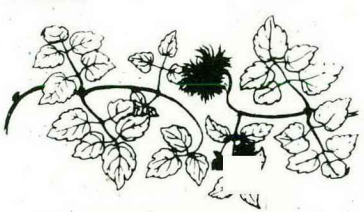
Total of 201 people attended the Networks Conference.

AGENCY/INTEREST

Government conservation management department	55
Government agricultural department	11
Government scientific organisation	8
Local government	6
University	30
Green movement/network	26
Art network	2
Aboriginal Trust	4
NGO	22
Consultant	9
Industry	2
Education	3
Media	4
School students	10
Individuals (incl farmers)	11

GENDER

Attendance	Papers Presented	
Males	107	66%
Females	94	33%



Conference Papers

1. **Land for Wildlife**

This is a voluntary scheme in Victoria where two thirds of the land is privately owned. Education of landowners, both those registered with the scheme and those not, is part of the drive behind the scheme. The aim is to ensure conservation initiatives continue with or without outside funding. The staff share with other groups the desire to develop a culture in which conservation is accepted as the normal mode of behaviour using peer pressure rather than rules and regulation to get people to 'fall into line'.

2. **Wildflowers Society Project**

This project set out to survey the large number of botanically interesting places near Perth. It was funded by National Heritage Fund. Volunteers did the survey work, professional botanists did the identification and analyses. The project was designed so that the volunteers did not need to know all 2,000 plants they would meet. At the end of the project the volunteers were keen to continue. The botanists however were pooped as they, unlike the volunteers, had been involved with all 19 weekend field trips (see 3. below). The project achieved the survey work and also achieved "know your plants, love your bush".

3. **Burnout**

Many of the papers described the importance of a local champion in the success of their project. Others talked of the importance of trust and of consistency of players in conservation projects. This can be difficult to achieve given natural history projects are often long term. The local champion often runs the risk of burnout. The solution seems to lie in creating a strong network which is not dependent for its survival on the drive of just one person.

4. **Knowledge/Communication**
Several papers suggested that we already knew enough to make appropriate conservation management decisions so why don't we?

Some reasons why: Scientists' training leads to a hesitancy to extrapolate from scientific data into management advice. Unfortunately in the political arena others advance advice on much less solid data.

Some scientific research focuses on mitigation of the symptoms rather than curing the cause. We need solutions to what caused the threat not just an answer to what to do next.

There is no economic push to act when, for example, a weed has just invaded.

Political indifference and bureaucratic inertia prevent knowledge being picked up and used.

The information doesn't get through to those who need to know. The biological ethos may be well understood by conservation groups but it needs to be communicated to other interest groups and the general public. The message needs to be communicated clearly, at the appropriate level (be that awareness, facts, concepts, values, action), and by the appropriate technique.

People have different agendas e.g., local people may agree with an ecological project but building the community hall seems a more pressing need, farmers cut down trees to make ends meet this year despite the consequence that salinisation will strike in the next year as a result.

5. **Involving the Public and Industry**
Information sought must be used otherwise consultation may be seen as a device of government.

Industry (Alcoa) support conservation networks because outcomes and information are shared and measurable progress can be made in a reasonable time frame. This is an area worthy of more exploration by DoC.

6. **Think Big/Start Small**
Lack of a big, bold vision often limits our progress in conservation more than the lack of money or know how. We need a vision to conserve the "real" thing not just a collection of isolated reserves which may protect 90-95% of native species but won't protect "wildness".

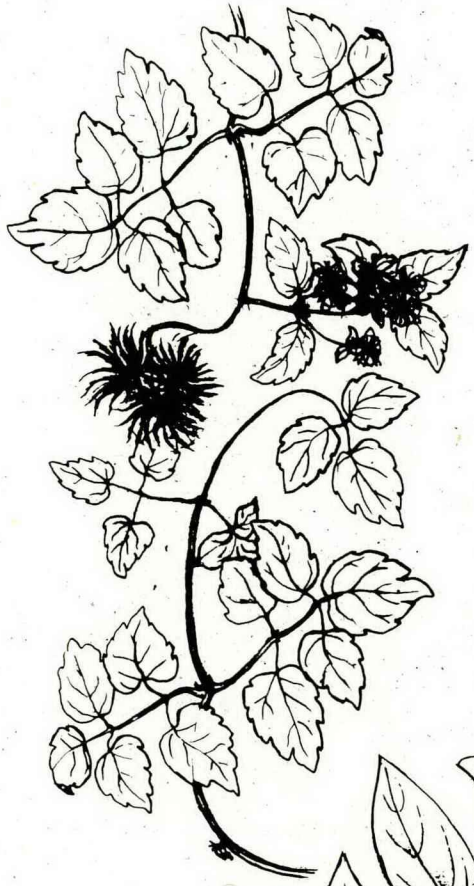
While most (91%) of Australians, and presumably New Zealanders, believe it is up to the present generation to conserve the environment, fewer actually take action on their own home patch.

Start with projects which are of particular local concern and, using this as a hook, move on to projects of more regional, national or even global concern.

Break complex, long term and 'intractable' projects into smaller, doable projects that can be achieved on a shorter time scale.

Demonstrate conservation e.g., encourage land owners to fence off small bits (10m x 10m) of their land to see what will happen. Chances are species will pop up that they haven't seen in a lifetime and this will do the sell job better than any data or talking.

Nature Conservation: the role of Networks



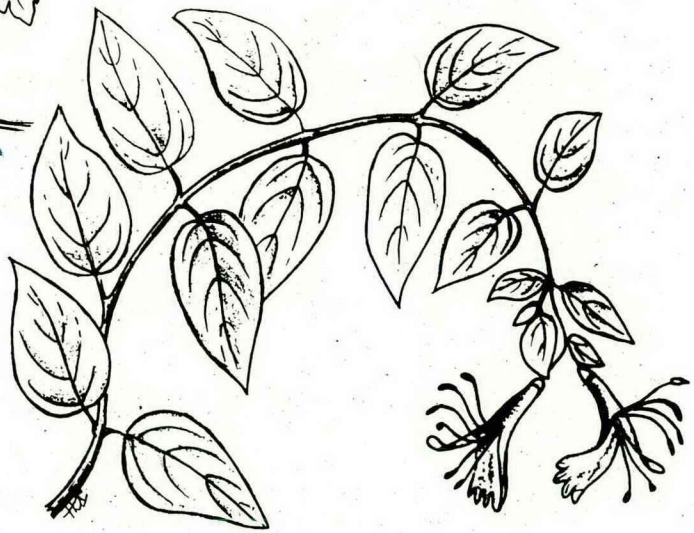
7. **Desirable Features of Community Projects**

- Problem clearly defined, short-term and solvable
- Problem relevant to a small, self-sufficient community
- Conservation aims incorporated in other aims of the community group
- Most operations conducted by the local community
- Each level of organisation nested within the one above
- Programme empowered by clear legislation

My own paper, "Community Groups and Weed Control", was well received as New Zealand Department of Conservation has a well developed volunteer programme. I had a further chance to talk about DoC's volunteer programme during a live 10 minute radio interview.

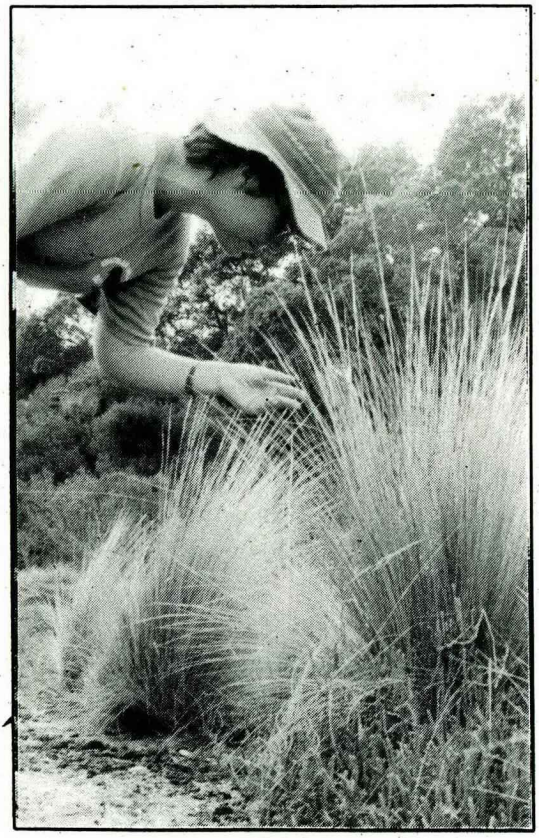
Susan M Timmins

S & R Division, Tory Street



West goes South

Carol West, that much beloved botanical person, has departed Wellington to take up a position in Invercargill as Conservation Advisory Scientist, Southland Conservancy, which, while a loss to us, does increase the number of women CAS's by 100%. Some of you may remember Carol's adventures on Raoul Island – (reported in issue 4, October 1993) with tea and gin. While we know Invercargill is not that far away – we hope that she took adequate supplies.



Not much chance for botanising in shirt sleeves in the deep south.

Fire and *Muehlenbeckia astonii*

When populations of species become extremely fragmented they become more susceptible to elimination from stochastic events. So the chance of extinction through misadventure or natural processes is enhanced. This was graphically demonstrated when arguably one of the best North Island populations of the endangered shrubby tororaro (*Muehlenbeckia astonii*) near Sinclair Head on the South Wellington Coast, was burned through an accidental flare up from a small beach fire on 11 February 1994.

As I am now based in Auckland I could only listen in dismay to the various accounts that made their way to me by phone and E-mail, of what seems to have been a serious fire. I felt all the more depressed because this population was one of the few national sites where natural recruitment had taken place, and it appeared to be relatively secure from the major threats acting on the species elsewhere in the country, e.g., scrub clearance, gravel excavation, competition with introduced shrubs, and of course animal browse. Further more, as the majority of the plants occurred some 20 m above the beach along the edge of a series of cliffs, they appeared to be well isolated from the possibility of damage by the public.

The fire served as a pertinent reminder that nothing is ever secure, and I was immediately thankful that – as with all other North Island sites – I had maintained a policy of collecting suitable cutting material to maintain an *ex-situ* stock. No sooner had I heard of the fire when I was informed that of the 9 plants I had sampled (various accounts suggested up to 11 plants occurred at this site,

but I never found any more than 9), 4 distinct individuals, 2 male and 2 female had taken from the cuttings I had supplied my research associate Tony Silbery, Plant Propagator at the Hutt City Council Percy Reserve, in Petone. Clearly we could use these plants to restore this site should it prove necessary.

However, I was intrigued with the reports I received that all the plants had been killed by the fire, this just didn't equate with what we know about the species biology. Mature *Muehlenbeckia astonii* plants possess a large bulbous root stock, which behaves somewhat like the lignotuber of an *Eucalyptus* or *Banksia*, i.e., following the removal of the above ground parts of the plant, this structure serves as a regenerative organ. Surely the fire would not have damaged this structure?

It appears not. About a month after the fire I was told that four plants had resprouted, and it appears that 90 days after the fire all those burned by the fire have resprouted. This is particularly pleasing although it does not necessarily mean the population will recover. Young *Muehlenbeckia* shoots are prone to salt damage, and are the favourite food of browsing animals.

Recently I have learned that John Sawyer (Wellington Conservancy) has put enclosures around the plants to make sure that this winters gales and visiting animals don't eliminate what at last census is 22% of known North Island population of this species.

I thank Tony Silbery, John Sawyer, and Carol West for keeping me informed of the changing fortunes of this population.

Peter de Lange.

S & R Division, Auckland

The missing archaeological site records

Historic resources conservation programmes cannot function properly without an effective archaeological site inventory system. Easy access to inventory information is vital to DoC's effectiveness in this area.

The New Zealand Archaeological Association (NZAA) Site Recording Scheme was established in 1958. In 1987 the NZAA agreed to DoC becoming a party to an existing agreement with the New Zealand Historic Places Trust (NZHPT), providing DoC with access to and use of information in the Site Recording Scheme.

As a result, DoC gained access to a large inventory of archaeological site records (currently over 47,000), relating to all conservancies, including sites recorded on offshore islands. The NZAA central file and an electronic index to the records (CINZAS - Central Index of New Zealand Archaeological Sites) are currently maintained by Science and Research Division, and some district files are in the care of conservancies. CINZAS is a component database of DoC's INDEX database, available to Head Office and conservancy users.

In recent discussions with the NZAA, the Site Recording Scheme has again been endorsed by both NZHPT and DoC as the national system for recording archaeological site information. In this way DoC benefits from the records contributed by others, and commits itself to contributing its own archaeological site information to the scheme in return. Both new and old information is readily avail-

able to those who have need of it, including DoC staff colleagues who may not have access to locally-held correspondence files or field reports.

Unfortunately, some field recording carried out by DoC or under contract to DoC is not contributing results to the Site Recording Scheme. This has the consequence that other people who might have need of information either do not know it exists or have difficulty getting hold of it. Information from the Site Recording Scheme is being freely used in many DoC projects, but in some instances people are not feeding new and updated information back into the system.

Apart from the fact that this is contrary to DoC's agreement with NZAA, it is unprincipled to take information and to give nothing in return. DoC staff are therefore asked please to ensure that all archaeological field recording is reported and filed in the NZAA Site Recording Scheme. Field recording contracts arranged by the Department should include a similar requirement. The same principle applies to all other databases in which DoC has an interest.

Tony Walton & Aidan Challis

S & R Division, Tory Street

The "electrifying" social event of the year!

Definitely the social highlight of the year occurred on Friday 15th July when we were greatly honoured with quasi-vice-regal visit by Her Graciousness Fran McGonigal to open the newly renovated, highly swept-up, electronics laboratory. H.G. arrived fashionably late after morning tea and swept along the third floor corridor to the cheers of the vast crowd, which almost reached double figures, awaiting her arrival. Choruses of God Save ... and hearty cheers were led by your humble scribe and the corridors echoed with loyal tributes from the great unwashed!! Financial constraints, as always, did not allow for the ceremonial laying of a cornerstone and brass plaques were absent, so Her Graciousness cut a tastefully draped ribbon. Her speech, which was suitably laced with religious references, called for the blessings of no less than five appropriate saints. Other than an grossly impertinent out-burst from one unattributable marine mammalogist from Australia (what can you expect from those incipient republicans) about the noise of construction, Her Graciousness's speech was well received with acclamation.

Murray Douglas, whose lab it was, then made a totally unintelligible mumbling oration whose context is best forgotten.

After the opening the vast crowd crushed itself into the new Laboratory with many "ooh's" and "ah's" indicating their level of comprehension of the electronic wizardry therein displayed. Coffee and jammy scones were rapidly consumed by the mob which then dissipated asking when H.G. would come again.

Space does not permit a full account of the fashionable raiment displayed by those attending. Manie Back and Tenner Slow caused gasps from the crowd with their chic ensembles while Faye Vert's outfit caused comments not appropriate in this family newspaper. Of the males present, "drab and gauche" come to mind as descriptors of their clothing. It is rumoured that the well known Brain Ovinephil went out immediately and ordered a tie of such hideousness that his wife actually approved of it!!

Over all it was a most enjoyable occasion. We look forward, with great loyalty, to Her Graciousness's next visit.

WERI – Wetlands of Ecological and Representative Importance

The New Zealand Wetlands Inventory (WERI - Wetlands of Ecological and Representative Importance) is a database of information about New Zealand wetlands. It was compiled from existing information sources held by a range of management agencies. WERI contains descriptions of nearly 3000 wetlands and includes information on their location and identity; tenure; hydrological class; geomorphic origin; community type; threats, modifiers and buffers; ecological, recreational, economic, educational, historic and landscape values, significanee and sources of information, and lists of associated plant and animal species.

The database was formerly managed in dBASE IV as a single-user copy on PC by the Information Services Unit, Science and Research Division, but soon the database will be available in every Conservancy office around the country in Oracle.

NIWA Freshwater Fish database

The NIWA (formerly MAF Fisheries) freshwater fish database is a comprehensive collection of site-specific fish records covering the whole of New Zealand, including Chatham and Stewart Islands. DOC now holds selected fields from the database in our own copy of the database.

Nine fields of data for all 10725 records are held by DOC. These are: the card and catchment number, the location, date, and fishing method, NZMS 1 and NZMS 260 map references, and the species found and their abundance and/or number. An update of the entire database is provided by NIWA every six months, including all new cards that have been entered, and all additional data that have been added to the database.

The database was formerly managed in dBASE IV on PC by the Information Services Unit, Science and Research Division. Previously, the database had to be split into fourteen separate data files for Conservancies, due to the inability of dBASE IV to handle large data files efficiently. The database has now been transferred to Oracle, and is currently undergoing testing. This will mean that all data will be available in every Conservancy office around the country, allowing comparison of distributions between Conservancies, etc. and the speed of processing in Oracle is far greater than that in dBASE IV.

Wetlands and freshwater fish databases

Both these applications have been designed so users do not need to know any programming language, and they are similar in look and feel to the existing Oracle applications, Biosite and Index.

Hopefully these applications will result in greater use of the New Zealand Wetlands Inventory and the NIWA Freshwater Fish Database, and the ease of use of the applications will encourage more users to access the information in their respective areas of concern.

Helen Adcock
Information Services Unit
S & R Division, Tory Street

What is a Bad Season for Yellow-eyed Penguins?

In recent years, Yellow-eyed Penguin conservation managers and researchers have talked about "good" and "bad" seasons for Yellow-eyed Penguins, without explaining what this means. In the mid 1980's to early 1990's it appeared that "bad seasons" had been increasing in frequency and that the mainland population was at risk of dying out. It was obvious in early 1990, when large numbers of adults were dying and hordes of chicks were taken in for hand-rearing that things were "bad". However, given that no two years are the same I decided to delve into historical information to get a better perspective.

At times like this, I fall back on Richdale (1957: A population study of penguins), which was a landmark book based on 18 years of meticulous observation at a study area on the Otago Peninsula. An unpublished Richdale manuscript written in 1942 (held in the Hocken Library) is also enlightening. He considered that at the start of his study in 1936 the penguin population had suffered from conversion of breeding areas to farmland and the encroachment of "human destructive agencies". His study area was a remnant of a formerly greater population, and breeding areas outside the main study area were "equally barren of birds". Even at that time, it seemed that the population decrease was leading to local extinction.

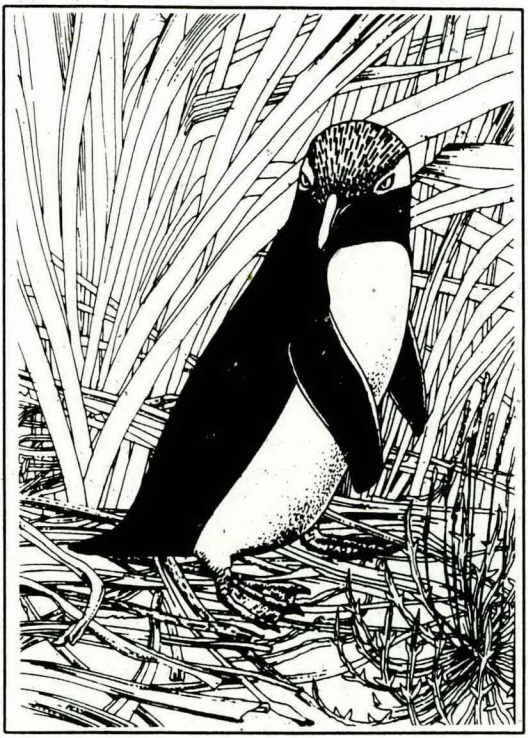
Richdale described some of the "human destructive agencies" as: commercial collectors before the 1920's; a series of devastating massacres by youths with pea-rifles, with up to 40 penguins killed in an afternoon; and continual egg robbing, a whole colony being deprived of eggs in 1939. Not surprisingly, in published material Richdale did not name his study area. He estimated in 1940 that there were no more than 130 breeding penguins (i.e. 65 pairs) on the Otago Peninsula. Interestingly, after the population crash in 1990, there were only about 79 pairs there (J. Darby pers. comm.).

During Richdale's study, the 1938–39 breeding season stood out as "being markedly different from all the others". Chick production was low (0.6 chicks/nest, when the average for the study was 1.1), only 22% of chicks that left the nest were ever seen again (the average was 41%), moulting was later than usual, and 26% of adults disappeared (the average was 16%). This seemed to affect the following season, causing a lower population (–25%), and a later than usual laying date (6 days later than the mean of 24 September), moderately-low breeding success, and further high adult and juvenile mortality. There was another small decrease in the local population. Richdale suggested that an unusual event at sea was affecting the food supply.

After 1940–41, Richdale's study area had a steady increase in numbers from the low point of 25 nests to 82 in 1952 (today there are only 24 pairs present; J. Darby pers. comm.). It seemed that economic depression and war activities elsewhere reduced interference on the breeding grounds and there was an adequate food supply at sea. The penguins responded with some very good years with high survival and chick output. Subsequently, there were below-par periods during the mid 1940's and early 1950's.

To return to the present day, we can see some parallels between what happened after a bad season in 1938–39 and after 1989–90. High adult mortality disrupted the breeding

system, so that in the following season there were fewer nests, former breeders failed to find partners, the laying date was late etc. The penguins



quickly bounced back though; e.g. in three areas of Otago Peninsula nest numbers increased from 26 to 43 in one year, then levelled off. Breeding appears to have stabilised, with the percentage of experienced birds increasing again, high levels of breeding success, the laying date becoming earlier each year.

From my look into the past I believe we can categorise seasons broadly as: a "population crash", when large numbers of breeding adults die over a short period causing a sharp population decline (e.g. early 1990); a "bad season", when mortality of adults and juveniles is high and breeding success is low, causing a decline and disruption to the following season (e.g. 1938–39, 1985–86); a "low survival year", when there is relatively high adult mortality and possibly juvenile mortality, but breeding success is high (e.g. 1951–52); a "poor breeding season", when chick production is low, which has a low impact on subsequent seasons (e.g., 1946–47); an "average season", when most parameters are normal (e.g., 1990–91); and a "good season", when survival and success are high (e.g. 1992–93).

It is encouraging to witness the Yellow-eyed Penguin's ability to cope with adverse events. Obviously, if they happen too frequently, the penguins will not bounce back. Our best ways of helping their survival is to continue to protect and enhance their breeding habitat, and to protect adults and chicks from predation by introduced predators. This should give the species a good chance of withstanding any food supply or environmental fluctuations.

Peter Moore
S & R Division, Tory Street

Sampling of patchy populations in ecology

In ecology, many populations have a spatial pattern that is patchy or clustered in some way. Sampling of patchy populations using cluster sampling or stratified sampling can give precise estimates of density, but both require the location of the patches in the population to be known. Often, all that is known is that the population is patchy, but not the location or size of the patches. For my PhD thesis research I have been looking at the question, "how applicable is adaptive cluster sampling to sampling patchy populations in ecology". I have been using computer simulations of spatial patterns and overlaying a sampling programme. I am also considering how practical is it to use adaptive cluster sampling for sampling a range of different ecosystems.

Adaptive cluster sampling is a recent development in adaptive sampling that has some potential for sampling populations that have a patchy distribution. In late 1992 a workshop was run in Tory St by Dr Steve Thompson who has published a few papers on adaptive cluster sampling, and more recently a book entitled "Sampling". At the workshop we ran through the mechanics of how the sampling design works, but I will briefly explain it here for those who are not familiar with it.

In the simplest case, consider a species of interest that has a patchy distribution, within a study area which is divided into quadrats. Prior to sampling, quadrats are randomly selected for the initial sample in the same way as they would be for simple random sampling. A quadrat is selected and the number of individuals in the quadrat counted. If there are more than a predetermined number of individuals (what is referred to as the critical value), the neighbouring quadrats are sampled. The neighbourhood can be defined in any way; the four or eight surrounding quadrats for example, or, as Thompson suggests, social (family groups) or institutional relationships. If in turn any of the neighbouring quadrats have a value greater than the critical value, then their neighbourhood is sampled, and so on. The total number of quadrats sampled, the final sample size, is the number of quadrats in the initial sample, and the number of quadrats selected adaptively. Adaptive cluster sampling can be applied to systematic, strip and stratified sampling.

With this sampling design, sampling effort is focused on localities in the population where the individuals are – in patches. The motivation for this development in sampling has come, in part, from researchers who, after spending a lot of time sampling quadrats and finding nothing, when at last a quadrat is sampled that has individuals in it, consider it worthwhile looking in the near vicinity of that individual. This more formal sampling design allows unbiased estimates to be made of density.

The estimation of the density of individuals in the study area (or of the total) requires special formulae as the familiar $\mu = x/n$ would be biased if used in adaptive cluster sampling because each quadrat has a different probability of selection, and instead there are two formulae suggested. Unfortunately, the better of the two has a rather unfriendly formula for calculating an estimate of the variance (what you need for calculating confidence intervals) but I have a written a short program that I can quickly put data through to calculate all the estimators for anyone

who does use this sampling technique.

A quadrat that is selected adaptively, (a quadrat not in the initial sample but in a neighbourhood), is sampled but will be used in the estimation of density only if its value is greater than the critical value. Essentially a lot of quadrats have to be sampled to be able to define what quadrats form a cluster. This raises one of the problems with this design. Many quadrats can be sampled, but for example, only half may be actually used in the estimation of density. In comparison to simple random sampling or systematic sampling where every quadrat sampled will be used in the formula to calculate density, for the same number of quadrats sampled, adaptive cluster sampling can be less precise (and considerably less precise if there is a high proportion of unused sampled quadrats).

Therefore, one of the first conclusions I can make, is that to use this sampling design, know your population well! Optimum results (where precision is comparable to more conventional methods) will be achieved only for very patchy populations and by setting appropriate critical values and definitions of the neighbourhood for each population.

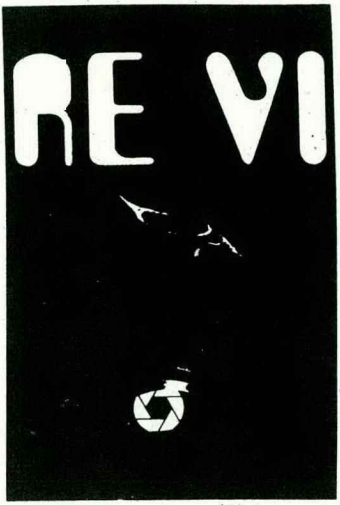
One other word of caution, the size of the final sample, that is, the actual number of quadrats that need to be sampled, can't be planned prior to sampling, as it depends on what quadrats are in the initial sample – whether by chance a patch has been selected or not. The final sample can be quite variable depending on how patchy the population is, so once again know your population well otherwise you won't know if sampling will be finished by lunchtime or after midnight!

Adaptive cluster sampling does have potential in ecology though; for sampling populations where there is already some information on the species of interest. Adaptive cluster sampling tends to be cheaper to undertake than simple random sampling as adjacent quadrats are sampled (and comparable to systematic sampling). The sample is essentially a sample of selected patches from which a frequency distribution of the patches in the population can be derived. Used in ecological monitoring, where there is something known about the spatial pattern of the population, sampling will be relatively cheap, and from the sample it maybe possible to detect the source of changes in abundance – from patches changing in size (density) or from the number of patches increasing/decreasing. By manipulating the critical value and the initial sample size, sampling effort can be focused on sampling within patches or between patches – depending on the main source of variation and the ecological question of interest. For specialised sampling requirements, it is a worthwhile design to consider – if it is designed well!

Jenny Brown

Dept of Mathematics and Statistics,
Otago University

FUTURE VISIONS



Bayer

NEW ZEALAND SCIENCE MONTHLY

Science Photography Competition

Bayer New Zealand Ltd
Grand Prize: $500

Hort+Research
The Horticulture and Food
Research Institute of New Zealand Ltd
Biological Prize: $250

NIWA
National Institute of Water &
Atmospheric Research Ltd
Physical Prize: $250

FOUNDATION FOR
RESEARCH, SCIENCE AND TECHNOLOGY
School Prize: $250

Send us your black-and-white or colour prints or slides showing us the art to be found in every area of science — Science Fairs, electron microphotographs, astronomical phenomena, backyard natural history.

Deadline: October 31st, 1994

Conditions of Entry

1. All entries will be returned by February 1995.
2. The *NZSM* takes no responsibility for entries lost or misdelivered due to poor or missing addresses.
3. All contestants will receive a copy of the competition issue (Dec/Jan).
4. Up to five prints or slides may be submitted by each contestant. Each should bear a caption clearly identifying both the subject and the photographer.
5. All entries are eligible for the Grand Prize. Only entries from primary and secondary school students are eligible for the School Prize (please include the name and address of your school).
6. The *NZSM* reserves the right to exhibit or publish any entries received, with full acknowledgement of the photographer.
7. Entries will only be considered if received by October 31st, 1994.
8. The judges' decision is final and no correspondence will be entered into.

Send Entries to:
Future Visions Competition
PO Box 19-760
Christchurch

NEW SCIENCE & RESEARCH PUBLICATIONS

NEW S&R PUBLICATIONS: *Copies have been sent to all CAS, to DoC librarians and to the Head Office library.*

Shaw, W.B. 1994. **Botanical ranking for nature conservation.** *Science & Research Series No. 72.*

A set of botanical ranking criteria developed during the Urewera/ Raukumara planning study, with some discussion of its application and limitations.

Robertson, C.J.R. and Lock, J.W. 1994. **Fluoride in New Zealand birds: a review.** *Science & Research Series No. 71.*

A compilation of measurements of fluoride levels for 127 New Zealand bird taxa.

Mitchell, C.P. 1994. **Whitebait spawning ground management.** *Science & Research Series No. 69.*

Observations on use and management of Whitebait spawning grounds on the banks of the Kaituna River, Bay of Plenty.

Jones, K.L. 1994. **Archaeological site stabilisation and reconstruction in the United States.** *S & R Internal Report No. 145.*

Report of travel to the United States on a Churchill Fellowship 1993. LIMITED DISTRIBUTION TO LIBRARIES ONLY.

CONSERVATION ADVISORY SCIENCE NOTES: *Copies have been sent to all CAS, to librarians and to the Head Office library. Further copies are available from Science Publications, at $2.25 (incl. GST) per copy.*

Hamel, J. 1994. **Otago central rail trail: an archaeological assessment.** *Conservation Advisory Science Notes No. 97.* 36p.

Rook, H. 1994. **Preliminary protection of Whitebait (Inanga) spawning areas in Hawkes Bay.** *Conservation Advisory Science Notes No. 96.* 14p.

Johnson, P.N. 1994. **Black Head: vegetation condition after quarrying.** *Conservation Advisory Science Notes No. 95.* 15p.

McShane, P.E., Mercer, S.F., and Naylor, J.R. 1994. **Surveys of Paua (*Haliotis iris*) off Nugget Point, southeast New Zealand.** *Conservation Advisory Science Notes No.94.* 22p.

Hodges, W. 1994. **Maori conservation ethic: A Ngati Kahungunu perspective.** *Conservation Advisory Science Notes No. 93.* 39p.

Laird, K. 1994. **Colouration and visibility of track markers.** *Conservation Advisory Science Notes No.92.* 23p.

Mitchell, C. 1994. **Recommendations for a fish pass on the Braemar lagoon water level control weir.** *Conservation Advisory Science Notes No. 91.* 10p.

Bergin, D.O. 1994. **Performance of transplanted indigenous salt marsh species, Maketu estuary.** *Conservation Advisory Science Notes No.90.* 16p.

Jackson, R.J. 1994. **Hydrological management of three wetlands.** *Conservation Advisory Science Notes No. 89.* 5p.

Jowett, I.G. 1994. **Native fish and minimum flows in the Kakanui River.** *Conservation Advisory Science Notes No. 88.* 20p.

Pierce, R. and Moorhouse, R. 1994. **Survival of Kaka following aerial poisoning with Talon on Whatupuke Island.** *Conservation Advisory Science Notes No. 87.* 5p.

Craw, J. 1994. ***Ageratina* at Waipoua and Taranga/Marotene Islands.** *Conservation Advisory Science Notes No. 86.* 2p.

Simpson, P. 1994. **Seeking a way to conserve fragments of native bush on private land: "Curtis Bush", Wainuiomata valley, Wellington.** *Conservation Advisory Science Notes No. 82.* 10p.

Wardle, P. 1994. **A locality for *Pittosporum obcordatum* in Catlins Forest Park.** *Conservation Advisory Science Notes No. 85.* 3p.

Wardle, P. 1994. **Botanical inspection of Birch Hill Flats, Mount Cook National Park.** *Conservation Advisory Science Notes No. 84.* 12p.

Buxton, R.P. 1994. **Ages of six kahikatea (*Dacrycarpus dacrydioides*) seedlings from Whataroa, South Westland.** *Conservation Advisory Science Notes No.83.* 2p.

Spurr, E.B. and Hough, S.J. 1994. **Behaviour of stoats to trapping tunnels.** *Conservation Advisory Science Notes No. 81.* 4p.

Duncan, K.W. 1994. **Susceptibility of terrestrial amphipods, especially *Tara taranaki*, to possum control operations.** *Conservation Advisory Science Notes No.80.* 3p.

Walls, G. 1994. **Kaweka mountain beech – animal pest problem.** *Conservation Advisory Science Notes No. 79.* 9p.

Eward, D., Putz, R. and McLellan, I.D. 1994. **Aquatic insects recorded from Westland National Park.** *Conservation Advisory Science Notes No. 78.* 18p.

Bourner, T.C. 1994. **Additional studies / observations on the heather beetle, *Lochmaea suturalis*.** *Conservation Advisory Science Notes No.77.* 3p.

Bourner, T.C. and Syrett, P. 1994. **The suitability of New Zealand moss species and heather litter as oviposition sites for the heather beetle, *Lochmaea suturalis* (Coleoptera: Chrysomelidae).** *Conservation Advisory Science Notes No. 76.* 6p.

McDiarmid, A. 1994. **Kina sampling and marine reserve monitoring.** *Conservation Advisory Science Notes No. 75.* 7p.

Barratt, B.I.P. 1994. ***Mecodema laeviceps* Broun: An assessment of the priority for conservation.** *Conservation Advisory Science Notes No. 74.* 20p.

Nichols, D.G. 1994. **Satellite tracking of large seabirds – a practical guide.** *Conservation Advisory Science Notes No. 73.* 22p.

NEW CONTRACT REPORTS:

Copies have been sent to all CAS, to librarians and to the Head Office library. (Limited further copies are available.)

Davis, M.R. and Langer, E.R. 1994. **Rehabilitation of lowland indigenous forests after mining in Westland: Fertiliser response of Karamu and Red Beech on soil and overburden materials disturbed by mining.** New Zealand Forest Research Institute. 10p.

Mitchell, C.P., Madgewick, H.H., Strickland, R.R., and van Boven, R.J. 1992. **The use of larval fish as an aid to identifying Whitebait spawning grounds, and the role of slugs ar predators on Whitebait eggs.** *New Zealand Freshwater Fisheries Miscellaneous Report No.127.* 16p.

This 1992 report is issued with a note from Marcus Simons, Manager, Freshwater Fisheries, EPPD, Dept. of Conservation, and should be studied in conjunction with Charles Mitchell's 1994 *S & R Series No.69* publication listed above.

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