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ConScience

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EDITORIAL

Welcome to the 28th and 29th issue of *ConScience*. This is a double issue to catch up on the issues missed in May, July, and September of this year while the Science & Research Unit was realigned.

There have been a lot of changes. Most of them for the good in our (once) division, now unit. In particular Science Publications has grown and split into two. One section under a Manager, Publishing and Marketing, the other under a new Chief Science Editor. I have taken on the publishing and marketing task and our new Chief Science Editor is Jaap Jasperse. Later in this issue Jaap will tell you how he sees his new job.

The prospects look good for both improved quality as well as better customer service. Looking toward improving customer service, we would like to have your input on this newsletter. We have not done a review since 1995, when we shifted from the A5 to the A4 size and incorporated the new design standards. So here is your chance to comment. You will find a survey form, and for the non-DOC readers a stamped addressed envelope—please help us out by returning the survey.

In this issue we begin a new regular feature—Letter From Samoa. Greg Sherley has taken leave to work for the South Pacific Regional Environmental Programme (SPREP) in Western Samoa. Greg will write to us from time to time about life and work in Samoa. Gregs letters have both humour and scientific interest as he works to develop a new project from scratch.

Other exciting changes include the strengthening of the Conservation Advisory Scientist network by new appointments in the Conservancies and the creation of three Regional Science positions. This issue has a profile on the Otago CAS Shirley McQueen. We hope to bring you profiles of the new Regional Scientists in the next issue.

Kaye Green
Editor

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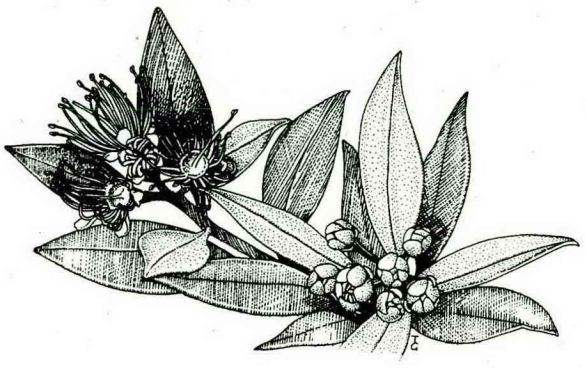


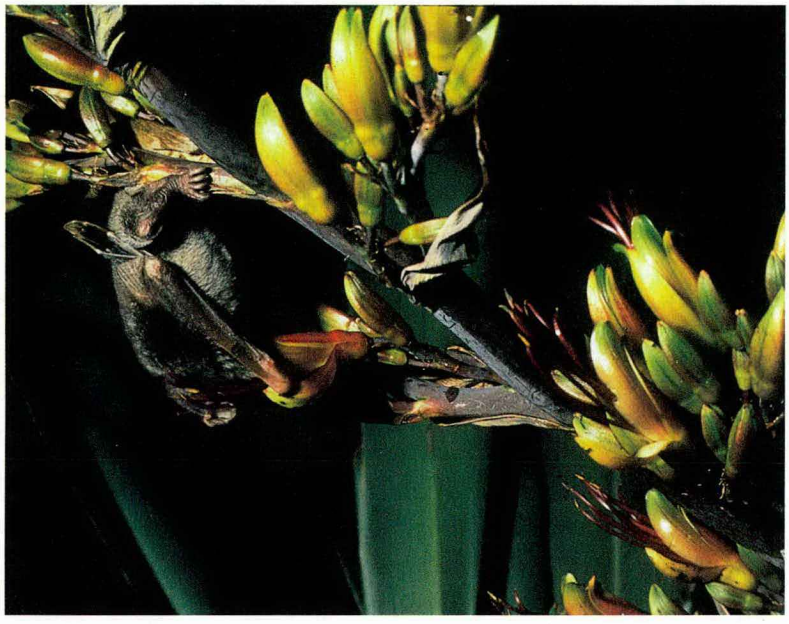
Department of Conservation
Te Papa Atawhai

CAS PROFILE!

Shirley McQueen—interested in bats

As a new CAS I am finding that tasks I am becoming involved in are very diverse, which reflects the great ecological diversity of Otago. Since starting in this role in late February there has been a lot to learn, but the issues are extremely interesting and this promises to continue.

Science advice and liaison will fill a major part of my time. The Departmental restructuring has resulted in the CAS role here being more part of the Technical Support team. It is proving to be enjoyable working with this talented group of people.



For the last three years I carried out research on short-tailed bats (with Brian Lloyd of Science & Research), assessing the impacts of aerial 1080 pest control. These bats are considered at risk of secondary poisoning through eating invertebrates that have fed on baits. This work was in Rangataua Forest, a magnificent red and silver beech forest near Ohakune. Papers were prepared on the ecological consequences of poisons used for mammalian pest control and presented at the Ecological Society Conference in Dunedin, 24–27 November 1998. My work, in the short term, will be writing up this material for publication, as well as carrying out a short-tailed bat diet study. I hope to begin some Otago bat research next summer.

I attended the New Zealand Bat Conference and Workshop in Ohakune during March, presented two papers and ran training sessions on the field use of automatic bat monitors used to conduct bat surveys.

My return to Otago has enabled me to renew contacts at the University of Otago, in particular with the Department of Zoology and also at Landcare, Dunedin. I look forward to revisiting some of Otago's many special places and exploring some of those new to me.

Following Carol West's example, if anyone can identify the location in the photograph of me (opposite, above) they will be rewarded with a suitable prize. Employees of Otago Conservancy (and their families) will be eligible to enter, but there will be another prize category for them.

Recent work

Lloyd, B.D.; McQueen, S.M. 1996. Conserving short-tailed bats in the fridge. *Australasian Bat Society Newsletter no. 7.*

Lloyd, B.D.; McQueen, S.M. (in draft) Evaluating the impact of 1080 operations on short-tailed bats (*Mystacina tuberculata*).

Lloyd, B.D.; McQueen, S.M. (in draft) Activity patterns of short-tailed bats (*Mystacina tuberculata*) measured by recording their echolocation calls in *Nothofagus fusca* forest.

McQueen, S.M. 1992. Effects of bleeding on the reproductive success of Fiordland crested penguins (*Eudyptes pachyrhynchus*) at Jackson Head, South Westland 1991. *Wildlife Management Report no.*

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Department of Conservation
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Content

Do you like the:

CAS Profile	O Yes	O No
Notes and News	O Yes	O No
Science in Progress	O Yes	O No
Books Available	O Yes	O No

What would you like to see added to ConScience?

Any further comments you wish to make?

Please forward to: Kaye Green
Science Publications
PO Box 10 420, WELLINGTON

By: 28 February 1999

Department of Conservation
Te Papa Atawhai

Shirley McQueen at a location within the Otago Conservancy.

24, Department of Zoology, University of Otago.

McQueen, S.M.; Lloyd, B.D. (in prep.) Risk of secondary poisoning in forest insectivors (*Mystacina tuberculata*) during aerial 1080 vertebrate pest control operations.

McQueen, S.M.; Lloyd, B.D. 1997a. Investigation into Secondary Poisoning: Short-tailed bats and their invertebrate prey. *ConScience* 26: 6–8.

McQueen, S.M.; Lloyd, B.D. 1997b. Pluto's progress—Survival and development in captivity of a baby short-tailed bat. *Kokako* 4(2): 15.

McQueen, S.M.; Davis, L.S.; Young, G. (in press) The reproductive endocrinology of Fiordland crested penguins (*Eudyptes pachyrhynchus*). *Emu*.

McQueen, S.M.; Davis, L.S.; Young. G. (in prep.) Reproductive endocrinology of Adelie penguins during courtship and incubation.

Morgan, D.; Ward-Smith, T.; McQueen, S. 1997. Responses of native birds and bats to 'Bee-safe' possum paste. *Landcare Research Contract Report* LC9697/126.

LETTERS FROM SAMOA

Greg Sherley has taken leave to work in Western Samoa. He writes about life and work in Samoa with both humour and scientific interest as he develops a new project from scratch.

First letter

Greetings!

Some have been giving me a hard time for not writing, so this is a start in the lunch break. It has been a trying time—getting over—in fact the hardest time since Ph.D. days. The difficulties are not all over yet, but many are. We got over here okay with our household effects largely intact. We brought far too much junk which will never be unpacked. Our house is very small compared to Taylor Terrace, but it has a million dollar view. I selected a place about 2,000 feet about sea level overlooking Apia. The view is stunning and at least two species of bats cruise around it in the evening, including the huge flying fox. The house section (about one acre) is surrounded by rain forest and pasture with Brahman cattle sometimes present. The valley below and above (as it were) is the reserve (forested) for the catchment supplying Apia's water supply. There is a dawn chorus which threatens to wake you up each day. Mark has complained about "those noisy birds". He has suffered a bit from the heat, but of course it is much cooler where we are compared with down town Apia. We get significantly more wind and rain which are very welcome here because they both reduce temperatures. The down side is a 25 minute drive to work for me and about 20 minutes depending on which school Brenda ends up teaching at. Yes folks I was outclassed by Brenda who was offered two good jobs here by private schools who made serious attempts at recruiting. Of course they are paying only local salaries—about one third New Zealand's rates.

Our main pain at the moment is buying cars. What a drag! The prices for 10-year-old vehicles are extremely expensive by NZ standards. Little Suzuki Samarais with odometers long since inoperable go for about NZ$7,000. And they are rough! . . . I can buy a new duty-free Mitsubishi double cab (two wheel drive) for about NZ$25,000 so will be trying to do that, but none are available for months. In the meantime I am floundering around the local market trying to find a half-decent second-hand second car. You are stuffed here without transport. There are heaps of buses and taxis, but the former are infrequent and very slow and crowded, and the latter often cannot get up the hill to home without boiling over. Driving is a nightmare. As someone said: you know when you are acclimatised to Samoa when you are driving without flinching. The roads are thoroughfare for people (lots) and stock, and dogs and . . .

Samoans are friendly, but not swift to provide service if that is what you are asking. However, they are really helpful. You feel really safe here although petty crime is high— cars broken into (not stolen), and houses always burgled (just a matter of time it seems). This latter despite an eight-foot fence and locked gates around our property. The fence has three strands of barbed wire which face outwards. This fence is fortunate, given that so much of our stuff will not fit into the house and the garage is completely open. The house, by the way, is only three years old— it is just the way things are done here.

SPREP has a mixture of old and new public service type features: bureaucratic with all the mod cons, but without modern office space. The "office" is a converted old factory built about 1950, I estimate. It is air-conditioned, but everything is open

plan— tightly squashed in. My work space is 3 m by 4 m and opens to a main thoroughfare, and is near a mens toilet which is not air-conditioned . . . Amidst the roar of the air-conditioner there is the extensive chatter of colleagues—not always discussing business . . . I drink about 2 litres of water a day. I am struggling a bit to get to grips with "the system" and what exactly is expected of me. No-one has done this job before. It is not very technical yet which I fear I shall miss. I shall have to keep up some writing to keep that part of my mind alive. I have about 5 manuscripts in for publication at present and 2 to write or contribute to writing. I have set aside a technical report for SPREP to try and keep some practice in science *per se*. The job is basically the art of networking and organisation. If I survive, (and you would be surprised at the number of resignations there are from SPREP), I shall come out a well-qualified organiser, project bidder/planner/designer, and expert on the requirements of the South Pacific in environmental management. More than just birds and pest species, you get involved with the full range of environmental work: waste management, pollution, ballast, sedimentation, education, etc. But the emphasis is 95% on birds and pests.

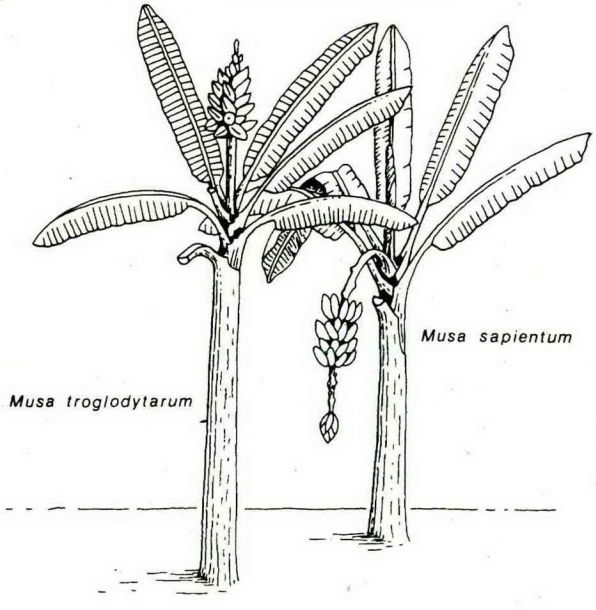
Not keeping that fit—two or three runs per week (fighting off attacks from very serious dogs, with a stick) and swimming in the very warm sea two or three times. Not far every time. The running is extremely hot and somewhat dangerous, and the sea swimming is a bit dangerous going for kilometres by yourself. Mountain biking is available, but the dogs are again going to be a pain—bikes still in their wrappers. A fit Samoan colleague will be taking me out this weekend. The beaches are absolutely fantastic and diving on the coral reefs brilliant—cannot describe the beauty.

Talofa lava

Greg

Apia, Samoa

The Pacific bananas, from a drawing by Jacques Barrau.



NOTES AND NEWS

What El Niño does to our ecosystem

The Ministry of Research, Science and Technology has issued a report by Dr Reid Basher of NIWA on the impacts of the 1997/98 El Niño event in New Zealand.

The El Niño is a natural feature of the earth's global climate system. El Niño events occur about 3 to 7 years apart, typically becoming established around April or May and persisting for about a year thereafter. Their main impacts arise from shifts in global rainfall zones, resulting in droughts in some regions and floods in others.

In mid-April 1998, the El Niño event was still very strong, but overseas computer models suggested that it would slowly wane over the next few months and perhaps be gone by the end of the winter. However, caution is advisable as there is considerable uncertainty in climate prediction.

A global survey of impacts shows that extensive regions involving dozens of countries and millions of people have been seriously affected by the 1997/98 El Niño. Reported impacts include drought-induced food shortages, massive forest fires, thousands of deaths from starvation, flooding and diseases, and reductions in economic growth forecasts. The event has been compared with the large 1982/93 event, whose global cost was estimated at US$8 billion.

In New Zealand, El Niño has been associated with more southerly winds than normal in winter, more southwesterly winds in spring and autumn, and more westerlies in summer. This resulted in cooler conditions nationally, and higher than average rainfall in the western regions and drought in the eastern regions.

However, there have also been large climatic variations arising from other unexplained and random causes. For example, the 1997/98 summer was very warm, culminating in the exceptionally warm month of February.

The phenomenon has had a wide range of impacts in New Zealand. There have been reports of significant pasture losses, production losses in animals, grains and fruit, tree deaths in native forests and plantations, and loss of water reserves in ponds, rivers and aquifers. The farm gate cost to agriculture has been estimated at over $425 million. However, it has been a good year for winemakers.

The effects on ecosystems have been varied, but substantial.

Exceptional dieback in native vegetation has been reported in eastern areas of both the North and South Islands, e.g., in regenerating stands of mixed *Nothofagus* forest in North Canterbury; in tawa, lemonwood and pohutukawa in eastern areas of the North Island; and in manuka in Marlborough. Pronounced wilting of understorey has been observed in drier hill slope forests in the eastern North Island and in Marlborough.

Reductions in sooty mould on trees have been observed, which are likely to affect dependent insect populations. In Taranaki, winds during early summer were the strongest on record and caused shredding of leaves on trees at exposed locations. Moss cushions and lichens have been torn from tree stems, and epiphyte cover has been reduced.

Decreases in live vegetation and increases in the fraction of bare ground and litter production have been observed in snow tussock grasslands in the Awatea Valley, Marlborough. Severe wilting of all species of the invasive weed *Hieracium* was also noted

gave the bird exercise and the occasional short running flight in the shallows, but still provided unexpected mishaps. "The dog [Mini] . . . is a real character . . . She protects the Albatross at the beach from other dogs and sometimes people. Once a dog did charge the Albatross and knocked him flat . . . Now we take Mini every time for protection."

At this time in late August, Bruce mentioned that "Albe" was 10 kg in weight. From an initial 6.7 kg, he had stabilised at about 8 kg in March–July, but had increased again. Maybe he was getting a bit fat. I suggested that fasting, rather than daily feeds, and increasing the gaps between meals might make him lean and hungry and more keen to leave. After all, breeding birds routinely fast up to three weeks when waiting for their partner to relieve them at the nest. Only a week later, on a stricter diet, he was much more lively, biting his patron and attempting half-hearted take-offs at the beach. On 16 September 1998, having lost a full kilogram of weight in three weeks, a 40–50 km/hr wind allowed "Albe" to run across the sand and become airborne for 50 m, then across the breakers for further bursts until he was out in the open ocean and "freedom". Eventually, Bruce lost sight of him, and after much patrolling of the coast for any sign, decided the release must have been a success. A long 207 days of rehabilitation were finally over. In that time "Albe" had been quite a media star, with several newspaper articles, radio and TV programmes about him. I'll miss Bruce's regular and entertaining updates on Albe's progress. Bruce and Maria were doing all the hard work, and learning from trial and error, but it was nice that my advice at least helped fine-tune the care of the bird, and kept their morale up. In Bruce's words, "I want you to know how much we appreciated your help and encouragement in this effort. You were on target all the time and that should give you a good feeling." Whether the albatross will be found again back on Campbell Island remains to be seen. The first birds start breeding at six years of age, so some lucky albatross worker may find him there sometime after the year 2003. I'll be keeping Bruce posted.

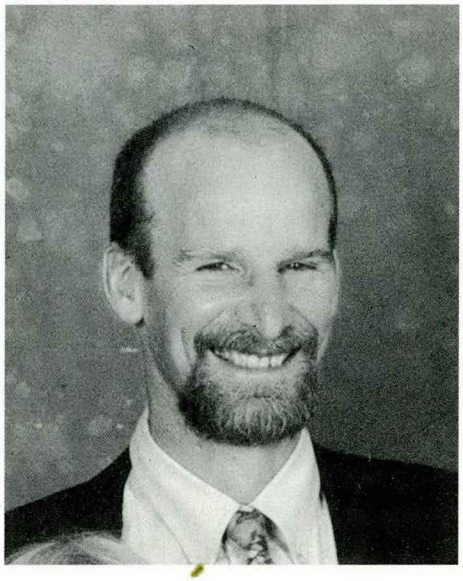
Peter Moore
S&R, Tory Street

Imber, M.J. in press. Diet and feeding ecology of the royal albatross *Diomedea epomophora*—king of the shelf break and slope. *Emu.*

Moore, P.J.; Scott, J.J.; Joyce, L.J.; Peart, M. 1997. Southern royal albatross *Diomedea epomophora epomophora* census on Campbell Island, 4 January–6 February 1996, and a review of population figures. *Science & Research Series 101.*

Robertson, C.J.R.; Kinsky, F.C. 1972. The dispersal movements of the royal albatross (*Diomedea epomophora*). *Notornis 19*: 289–301.

Chief Science Editor enjoys a challenge or two



In September 1998, the new position of Chief Science Editor at the Science & Research Unit of DOC was filled by Jaap Jasperse (pronounced: Yahp **Yass**-pur-suh). After three months in the job, *ConScience* asked him about his work and aspirations.

ConScience: What do you see as your main objective in the job?

Jaap: Getting the message across in the best possible way: from the people doing research, to the people who need to use the results. That's what science communication is all about. "Best" means to me: accurately, as quickly as practicable, and using the most appropriate technologies. I'll be dealing mostly with scientific journal submissions and DOC's internal printed publication series, but also with electronic resources. As an innovator, I see DOC's developing Intranet and public website as holding great promise for us all.

ConScience: Where have you come from?

Jaap: That's always a difficult question to answer straight away, because I never know if people refer to my strange accent, want to know where I live(d), or ask where I worked before joining DOC. To answer all of it together: my Dutch roots have taken well to the Hutt Valley's western hills, and over the years I produced a number of Kiwi fruits of labour that range from science journals published by the DSIR, to a PhD thesis on CD-ROM. In the previous 7 years I worked for the Royal Society of NZ: as Science Publisher, then as Internet Strategist and a year as IT Co-ordinator. Those experiences come in handy in my new job.

ConScience: How does the DOC job differ from editing a national science journal?

Jaap: With the journal, my aims were always to see good manuscripts into print as quickly as possible, improve reasonable manuscripts where feasible, and protect readers from bad ones. I now focus on helping all DOC authors improve their writing, aiming for efficient throughput of manuscripts, and further improving the quality of S&R Publications.

ConScience: Your pet editorial hate?

Jaap: I'm a sucker for consistency, and get easily wound up by the fact that most DOC staff abbreviate their Department as DoC—despite the Deskfile prescribing a capital "Oh".

ConScience: What do you do to **un**-wind?

Jaap: Triathletics: swimming, cycling and running. Have just completed the Lake Taupo Challenge. I hope to get at least one S&R relay team together next year to tackle the 160 km bike ride around the lake together. It's indicative of a switch I'd like to make at this stage of my life: from mostly individual pursuits, to a team approach. DOC provides just the right environment for that!

A present for DOC staff!

In the spirit of the season, the Institute of Geological and Nuclear Sciences is offering big discounts to DOC staff, on four types of geological maps.

These maps are all suitable for Christmas presents — particularly the GNS geological maps at 1:50,000, which are gloriously glamourous — and an excellent reference for school and university students, outdoorsy types, intelligent observers, the incurably nosey, and DOC staff. And any combination thereof.

Geological maps of New Zealand 1:250,000 are offered at the discounted price of $10.50 each. The entire country is covered by 28 of these maps and there is explanatory text on each map. Usual price is $15.00. The Wellington, Taupo, and Rotorua maps are becoming very rare, and are not included in the discount collection.

Geological maps of New Zealand 1:63,360 are discounted to $17.50 each. This is the old inch-to-the mile series so there is a lot of detail. Usual price $25.00. Geological maps of New Zealand 1:50,000 are at the discounted price of $21.00 each. This series started in 1980 and each map comes with an illustrated booklet.

Institute of Geological and Nuclear Sciences geological maps 1:50,000 are discounted to $35.00 each (except for Banks Peninsula, Otago, and Buller which are just $21.00 each because all the information is on the map, rather than in an accompanying book). Fascinating, full-colour, easy-read books come with these post-1992 maps. Their normal price is $50.00.

The price includes packing, postage and gst.

For further information, please contact Lee Aitken at GNS

email: l.aitken@gns.cri.nz

telephone: 04-5704-880

DOC prizes

The New Zealand Limnological Society Conference was held in Dunedin from 30 November to 2 December 1998. This year, with sponsorship from the Department of Conservation, the society was able to offer three book prizes to students who had made a significant contribution to conservation.

The awards were made to:

Tony Dugdale of Waikato University for his paper "Charophyte restoration by seed bank Manipulation".

Miranda Polglase of Massy university for her paper "Waterways self assessment guide- a monitoring tool for land owners".

Mike Joy of Massey University for his paper "The application of a predictive model of riverine fish community assemblages in the Taranaki region of the North Island, New Zealand".

RESEARCH IN PROGRESS

A decade of research on revegetation of coastal sand dunes using native dune plants

For almost 10 years Forest Research in Rotorua has been evaluating a wide range of native species for restoration of coastal sand dunes. There has been great demand over the years for research and dissemination of information on revegetation and management of our coastal dunes from a wide sector of the community and the interest, if anything, is increasing.

Such has the demand been for information on sand dune revegetation that it became clear a co-ordinated approach was needed regarding sand dune research and management issues as well as the need for an effective mechanism for the transfer of technology. About a year ago the Coastal Dune Vegetation Network (CDVN) was established to bring together interested parties including local land managing agencies (Regional and District Councils), community-based Beach Care and Coast Care groups, Maori Trusts and iwi, consultants, nurseries, the Department of Conservation, and Forest Research as research provider. The aims of the network are to prioritise research of relevance to managing agencies, iwi and community-based interest groups, to assist with research funding, and to promote effective transfer of technology. The CDVN, together with Forest Research, with funding from the Sustainable Management Fund, Ministry for the Environment, have undertaken to publish a Technical Bulletin series that will provide the latest available information from a range of sources on sand dune revegetation and management issues.

Establishing sand binders on foredunes

Initial research emphasis at Forest Research has been on evaluating the native sand binders pingao (*Desmoschoenus spiralis*), spinifex (*Spinifex sericeus*), and sand tussock (*Austrofestuca littoralis*) for revegetation of degraded foredunes and stabilising mobile sand. Pingao and spinifex were identified by the botanist Leonard Cockayne as the major indigenous sand-binding grass species that occurred widely and performed an important role in stabilising foredunes. Pingao is an endemic sand-binding plant found growing on or near coastal foredunes with most populations now reduced to small discontinuous patches and continuing to decline. Spinifex is native to both Australia and New Zealand. In New Zealand, it occurs on sand dunes throughout the North Island and the northernmost part of the South Island. Throughout its range it often is the dominant species on the foredune. Spinifex populations are, however, degraded along sections of many beaches where continual disturbance by beach users and grazing stock creates breaks in the vegetation cover and allows excessive sand movement. In Australia, spinifex has been used for many years as one of the major species in large-scale sand dune rehabilitation programmes and techniques widely used in Australia for establishing spinifex are being evaluated in trials in New Zealand. According to Cockayne, sand tussock was found along all parts of the coast of New Zealand. Its principle habitat is sand plains, although it does oc-

cupy mobile foredune sites. It is now very restricted in range and abundance, probably because it is susceptible to disturbance and is palatable to animals.

Of the three indigenous sand-binding species, pingao has been the species most widely raised in nurseries and planted on dunes. Pingao seed can be collected in large quantities and it responds to standard nursery raising procedures although it is sensitive to over-watering. Spinifex seedheads tend to have a low proportion of sound seed, and the seeds are slow to germinate. Spinifex has proved difficult to raise on a large scale in nurseries in both New Zealand and Australia. However, collaborative pilot trials, by Forest Research and the Bay of Plenty nursery, Naturally Native NZ Plants, are currently in progress and results to date are very promising. Apart from sourcing reasonable quantities of seed, there have been no problems with raising seedlings of sand tussock.

Pingao seeds

Nursery-raised seedlings of all three sand-binding species have been planted out at both North Island and South Island sites. They have performed best where there have been moderate rates (10–25 cm per year) of sand accumulation. Trials indicate that they are site specific but respond positively to application of the slow-release fertilizer Magamp (magnesium ammonium phosphate), at the rate of 30g per plant incorporated with the sand at time of planting. With all three species, group planting of 10–20 seedlings at approximately 50 cm spacing between plants has been effective in dune building after 6 months.

Trials based on successful Australian work where spinifex seed has been sown directly on dunes or where stolons have been transplanted directly on dunes, have resulted in low establishment rates at both North Island and South Island sites. On the basis of experimental results to date, direct seeding or transplanting of spinifex cuttings cannot be recommended for New Zealand conditions.

Although nursery-raised seedlings of the three indigenous sand-binding species have been widely established on foredunes, success in not always certain. It is not always easy to identify optimum sites for planting. Foredunes are subject to a range of adverse weather and sea conditions including occasional very high tides, storms, strong winds from different directions, temperature extremes, and impact by human and animal activity. Failures with revegetation programmes are to be expected from time to time and losses from storms or human impact will vary over short distances and from one year to the next. Therefore, rehabilitation strategies that spread the risk both temporally and spatially are most likely to succeed. Where planting is being considered as a rehabilitation strategy, the aim should be to produce large numbers of seedlings at low cost, to plant key areas as densely as possible and to plan for and be prepared for ongoing maintenance of the vegetation cover through replanting and fertilizer treatment. An overall site management plan in which planting is carried out with the support of the local community and in conjunction with other measures (including control of beach users by the use of fencing and accessways, control of browsing animals, and fertilizing of remnant native vegetation) is likely to be successful.

Revegetation of backdunes

Planting trials at several North Island and South Island sites are in progress

RESEARCH IN PROGRESS

to determine the most appropriate species and the most effective techniques for large-scale revegetation of modified back dune sites. In collaboration with local authorities and the Beach/Coast Care groups, species screening trials were established on backdune sites at Whitianga on the Coromandel Peninsula and at South Brighton, Christchurch. The North Island trial was part of a large dune nourishment project using local indigenous species while the South Island trial was aimed at determining appropriate strategies for establishing mainly indigenous vegetation on backdunes currently dominated either by marram grass (*Ammophila arenaria*) or ice plant (*Carpobrotus edulis*). Several thousand nursery-raised seedlings were planted at each site in replicated randomised complete block designs testing a variety of coastal ground-cover, shrub and tree species. Several treatments were compared, including seedling quality and size, site characteristics, shelter, application of bark mulch and Magamp fertilizer.

Species performance differed dramatically between regions. Of 16 indigenous species planted in the South Island trials, only three—tauhinu (*Cassinia leptophylla*), *Euphorbia glauca* and harakeke (*Phormium tenax*)—have shown reasonable survival and growth on the marram grass-dominated site. Performance of all species planted on ice plant dominated dunes at Christchurch has been poor. In contrast, the North Island trial has shown high survival rates and good growth for most of the 26 indigenous species planted. Application of a Magamp fertilizer at planting has boosted growth of seedlings. Some species have benefited from artificial shelter. No improvement was apparent where a bark mulch had been placed around seedlings. The trial has identified at least 10 hardy indigenous species with high survival and good growth rates. These are harakeke, the woody ground-covers pohuehue (*Muehlenbeckia complexa*) and sand coprosma (*Coprosma acerosa*) and the coastal shrub and tree species akeake (*Dodonea viscosa*), coastal five finger (*Pseudopanax lessonii*), pohutukawa (*Metrosideros excelsa*), ngaio (*Myoporum laetum*), karo (*Pittosporum crassifolium*), taupata (*Coprosma repens*) and tauhinu. A step-out revegetation trial recently established at Matarangi Beach is testing the most successful species and establishment techniques with emphasis on species mixtures and planting patterns appropriate to different zones within the foredune to backdune continuum.

Challenges to restoration of indigenous plant communities on backdune sites are numerous and complex due to the range of sites and microclimates and the dynamic nature of plant communities. While early results from backdune trials on the Coromandel site are highly promising, there are major problems for revegetation of exposed sites such as those at Christchurch dominated by marram grass, ice plant or other exotic species. A major commitment to long-term research is required to develop practical cost-effective techniques for the revegetation of backdunes using indigenous species.

D. O. Bergin and J. W. Herbert
Forest Research Institute, Rotorua

See box on back page for details of the Pingao publication.

Genetic variation in Hector's dolphin

Hector's dolphin is New Zealand's only endemic cetacean. The population is estimated at 3000–4000 individuals, small numbers being found between Kawhia and Manukau Harbour in the North Island, while the main concentrations are at Banks Peninsula, along the west coast, and at Te Waewae Bay in the South Island.

Stephen Dawson and his colleagues at Otago University have collaborated with the University of Auckland School of Biological Sciences on a DOC contract to study the genetic variation and population structure of Hector's dolphin (Cephalorhynchus hectori). *This summary of their work was prepared by Geoff Gregory, Contract Editor at S&R, Tory Street.*

Hector's dolphins have a marked preference for close inshore waters. Within these regions their distribution is highly clumped. There is no evidence of seasonal along-shore migrations and little evidence of movement between the localised groups. Because of their small population size and fisheries-related mortality, they are classified as vulnerable by IUCN. They are prone to entanglement in gillnets, and the population cannot sustain the resulting level of mortality. This led to the establishment of the Banks Peninsula Marine Mammal Sanctuary in 1988.

Genetic analysis can provide important information for conservation management of small and threatened populations such as Hector's dolphin, one of the primary applications being the identification of populations with independent evolutionary histories. The objective of this project was to examine the variable mitochondrial DNA central region of available samples of Hector's dolphins in order to determine the degree of migration and gene flow between local populations from different geographic regions. The hypothesis was that, as the South and North Island groups are separated by the geographic boundary of Cook Strait, they might be reproductively isolated, and that groups on either side of the South Island might be isolated from each other as well.

Samples were collected from beachcast or bycatch Hector's dolphins from around New Zealand: nine from around Banks Peninsula and four from elsewhere on the east coast of the South Island, nine from the west coast of the South Island, and one from the North Island.

The results provided clear evidence that the east coast South Island and west coast South Island populations of Hector's dolphins constitute independent Evolutionarily Significant Units. The haplotypes formed a relationship in which the closest relative of any given individual was also within the same geographic region.

This genetic evidence of population structure is consistent with other evidence showing that the range of along-shore movement of Hector's dolphins is remarkably small, and that local populations are isolated by barriers which may be both behavioural (low migratory range) and geographic (deep water).

The single North Island sample was genetically distinct from both the west and east coast South Island populations, suggesting that this region, too, may constitute an Evolutionarily Significant Unit. Additional samples are required to determine this.

The finding that genetic separation exists across small distances has considerable management significance. Small separate populations are generally more susceptible to extinction through genetic effects as well as demographic and environmental chance. This means that effective conservation management of Hector's dolphin has a new urgency.

RESEARCH IN PROGRESS

Fire ecology and management. Recommendations from a western Australian fire ecologist

Fires have occurred in New Zealand for millions of years but their frequency and severity has increased dramatically since human settlement. The Department of Conservation deals with 100–150 fires each year at an average annual suppression cost of about $300,000 combined.

DOC invited Neil Burrows, a fire ecologist with Department of Conservation and Land Management (CALM), Western Australia, to visit New Zealand and assess our needs.

The Department has twin responsibilities with respect to fire. It is a Forest and Rural Fire Authority and has a policy to extinguish all fires on or near land that it administers, principally to protect life and property. In addition, the Department must manage the land it administers to protect conservation values. Some ecosystems, such as native forest, are destroyed by fire. Others, such as tussock grasslands and some wetlands, are fire-induced and depend on fire—if only very occasionally—for their maintenance.

Fire is clearly an important influence on conservation values and a potential threat to life and property. However, our understanding of its effects on biodiversity and on ecosystem processes is insufficient to effectively manage native ecosystems with respect to fire.

So the Department invited Neil Burrows, a fire ecologist with Department of Conservation and Land Management (CALM), Western Australia, to visit New Zealand and assess our needs. We asked him to:

- Assist with the investigation of the role of fire in the management of protected natural areas for specific conservation values
- Assist with the development of appropriate protocols for monitoring the effects of fire on vegetation and invertebrates.

Neil gave a seminar at the end of his trip at which he presented some of his initial thoughts. Since then he has written a draft report, soon to be published. Some of the recommendations from his report are given below:

Management

1. That a comprehensive and systematic national wildfire risk analysis be undertaken to quantify the risk posed by wildfire to human life and property and nature conservation values in New Zealand.
2. That DOC, in collaboration with other rural fire authorities, develop "fuel accumulation" models for major flammable vegetation types. This can be achieved by sampling a range of comparable habitat types with known but different times since fire (space-for-time study).
3. That a GIS database be assembled containing information about the important fire-induced vegetation types, viz. wetland, tussock grassland and shrubland and fire-vulnerable ecosystems. Data should include location (a map), special site features, management history (including fire), as well as vital attributes and post-fire responses of plants and significant fauna.
4. That DOC consider the strategic introduction of prescribed fire to assist with the control of wildfires and to maintain some ecosystems (especially tussock grasslands).

Monitoring and research

5. That a national fire research working group be established in New Zealand to promote fire science, to identify gaps in knowledge and opportunities for collaboration, to exchange ideas, to disseminate information, to integrate research activities and to attract fire research funding.

6. That the most appropriate systems for monitoring the effects of fire and of fire exclusion on both vegetation and invertebrates in fire-prone ecosystems be adapted for use in New Zealand.
7. That a national and multi-agency space-for-time investigation of the impacts of fire on native communities, species and processes be undertaken soon.
8. That DOC employ a fire ecologist to develop and implement the Department's fire research plan, to develop internal and external linkages, and to provide scientific advice to DOC managers on fire issues.
9. That DOC exchange fire research staff with CALM to provide an opportunity for a cross-flow of knowledge and ideas relevant to fire research methods and fire management.

Susan Timmins and Kerry Hilliard
S & R, and Central Regional Office

Impact of the common wasp on native insects and birds

Common wasps (*Vespula vulgaris*) can reach very high densities in South Island *Nothofagus* forest. Their biomass has been estimated to exceed the combined biomass of all major predators there—birds, rodents and stoats.

Their potential impact on the forest ecosystem is severe. A major part of the wasp's diet is honeydew, produced by native scale insects (*Ultracoelostoma* sp.) living on the beech trees. In addition they feed on three main invertebrate groups—flies, caterpillars and spiders—consuming about the same biomass of prey as is eaten by the entire insectivorous bird population. So, as well as the direct effect on native invertebrates, they compete with native birds and invertebrates for honeydew and insects.

Poison baiting is the only means for widespread reductions in wasp density, but it is costly and time-consuming and needs to be repeated every year.

Under a DOC contract to assess the potential conservation gains to be made from an intensive poisoning campaign, Jacqueline Beggs and coworkers from Landcare Research, Lincoln, poisoned wasps annually for four years at two 30 ha beech sites in Nelson Lakes National Park. Compared with control sites, 82–100% of the wasp colonies were killed, but reinvasion by foraging workers meant that final numbers were only reduced by 55–70%.

Standard 5-minute bird counts indicated that there were more grey warblers at the two poisoned sites than the non-poisoned sites, and more silvereyes at the end of the period than the average number present in the earlier years. There were no apparent differences for other species.

The research team also carried out bird counts along a 2 km transect at Mt Misery and compared them with counts carried out at the same stations between 1974 and 1983, before the common wasp arrived in the area. There was a significant decline in numbers for 10 species (including fantail, grey warbler, tomtit, robin and bellbird), although silvereyes increased. This does not prove that wasps have caused the reduction in

RESEARCH IN PROGRESS

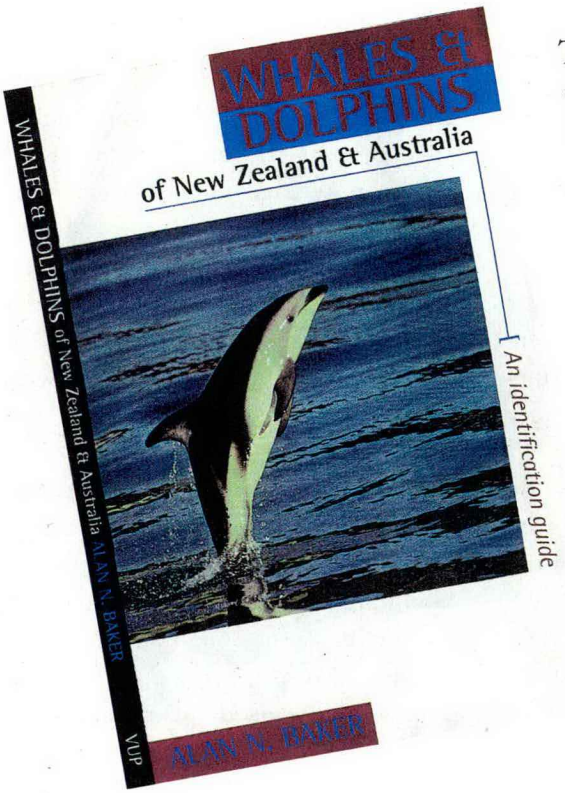
numbers, but does suggest they are having an impact, at least for grey warbler.

In addition the predation rate by wasps on experimentally placed free-living caterpillars and orb-web spiders was assessed. After 3 hours of exposure at a non-poisoned site, only 17% of large caterpillars and 63% of small caterpillars survived. A model based on these predation rates estimates that virtually no caterpillars would survive a 3-week larval stage at the peak of the wasp season. On the other hand, Lepidoptera producing free-living caterpillars in spring would be little affected by the small number of wasps around at that time of the year; nevertheless wasp abundance needs to be reduced by 85–91% to conserve them through the peak of the wasp season. Similarly, the probability of a spider surviving to the end of the wasp season was virtually nil, and wasp abundance would need to be reduced by 80–90% over the entire season to protect populations of orb-web spiders.

One biological control agent against *Vespula* wasps, a wasp parasitoid (*Sphecophaga vesparum vesparum*), has established in New Zealand. It is suggested that this parasitoid will eventually suppress wasp nest density by about 10%, although it has not yet done so. Neither this nor poison-baiting reduces wasp density to a level that will conserve all caterpillar and spider species.

J.R. Beggs, R.J. Toft. J.S. Rees, J.A.V. Tilley, and J.P. Malham
Landcare Research, Nelson

Pre-publication announcement



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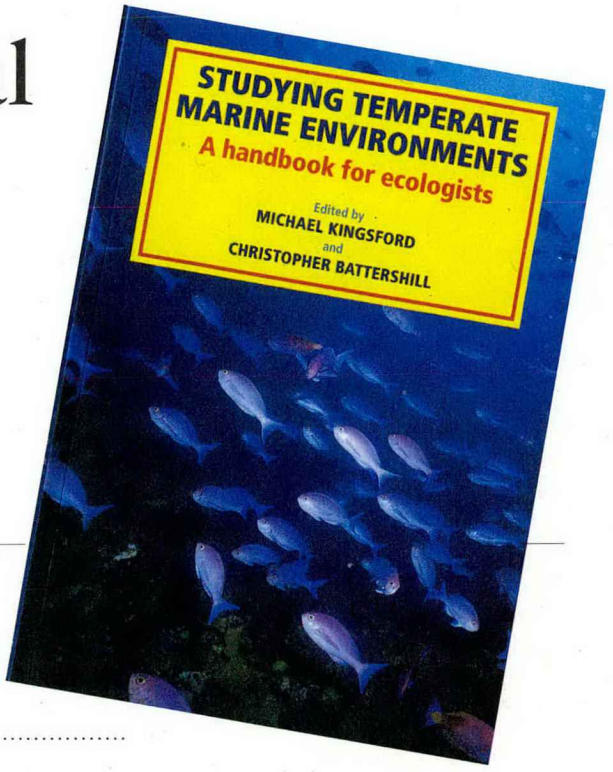

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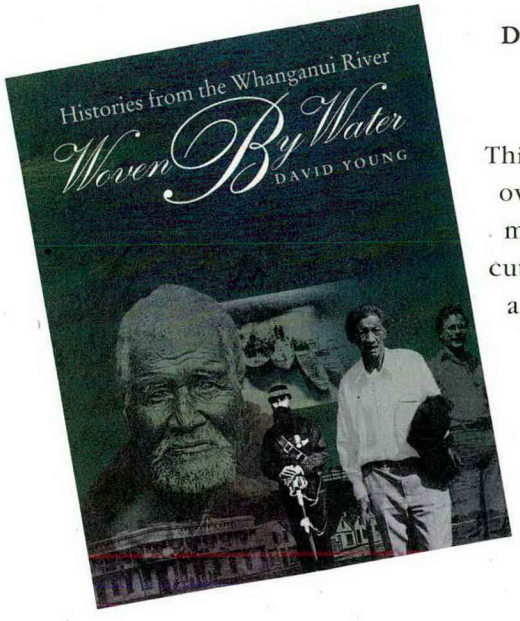

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Price: Christmas special to DOC staff 39.95
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Pingao on coastal sand dunes

CDVN Technical Bulletin no.1

The first *Coastal Dune Vegetation Network Technical Bulletin* has just been published. This is a 20-page full-colour booklet on the native sand-binder pingao giving practical guidelines on identification, seed collection, propagation, and establishment of seedlings. Copies are for sale from Forest Research, Rotorua for $11.25 each (includes GST) plus $2 postage (discount for 10 or more, postage on application).

Enquiries to:

Myra Cocker, Publications,
Forest Research, Private Bag 3020, Rotorua.
Phone: 07 347-5755
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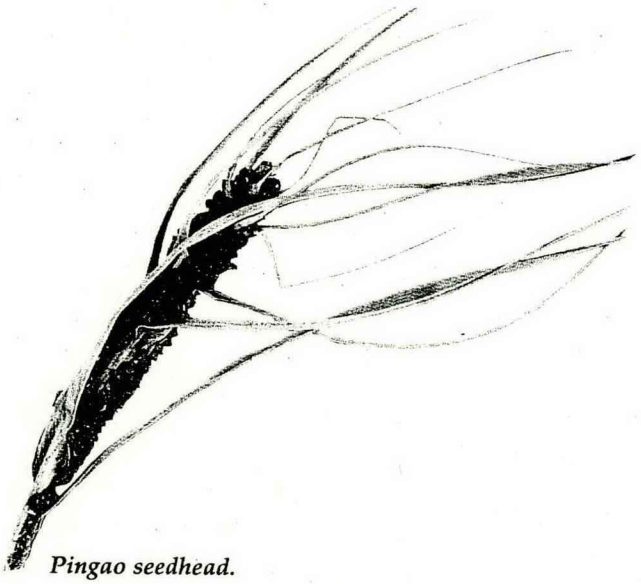

Pingao seedhead.

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