NEW ZEALAND ECOLOGICAL SOCIETY

Newsletter

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FROM THE EDITOR

INTECOL

After a long build up, and a tremendous amount of work by the many conference organisers (including the NZES team of Kate McNutt and Bruce Burns with Carol West on the scientific panel), INTECOL seemed a long time coming. With 1300 ecologists (from 56 countries), over 60 talks including some outstanding plenary sessions, and a changing poster display each evening it was worth the wait. I certainly got a lot out of attending. It was evident that although there are important differences between island ecology and continent ecology, the rest of the world are facing similar issues as New Zealand—erosion, water quality, unsustainable land-use practices, loss of habitat, biodiversity declines, and some tough challenges and harsh realities when it comes to restoration attempts. Listening to talks from all around the world I was struck at how insular and narrow focussed we can tend to be. While the rest of the world is concentrating of modelling the future, out of necessity we are still focussing on killing things to ensure we still have a future. Having said that, it is evident that in many areas New Zealand's ecological science is leading the way.

New Zealand was well represented with 113 delegates, 32 of whom were awarded an NZES grant to attend. Bringing a taste of the varied work presented at INTECOL to your screen, the next few issues of the newsletter will be featuring the abstracts and posters of NZES members.

Still on INTECOL, this issue Dr Paul Blaschke shares his impressions of the conference from an applied scientists point of view.

Following on from INTECOL, I grabbed the opportunity to spend a few days in a new place, and revel in some spectacular landscape that is simply teeming with wildlife. The contrast to a silent, empty New Zealand is stark and depressing. After years of watching David Attenborough, it was a big thrill to see for myself the likes of a satin bower bird proudly showing off its collection of blue things to a seemingly disinterested potential mate, and to have an Albert's lyrebird leap out at me—pheasant style—while walking through some majestic temperate rainforest. Reptiles seemed so plentiful that if the water dragons hadn't moved so fast, and the monitor lizards weren't so big we could have easily have stood on them so thick on the ground were they. Indeed, I nearly did step on the tail of a three-metre python that was lazily draped over some stream rocks. I was somewhat beside myself with a long history of preferring my snakes behind glass, but to my disgust the python was not at all disturbed about the presence of humans and decided to use the path rather than take to the bush, slithering in the face of all that reassurance about "you'll be sweet, snakes

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Amazing! Just like David showed us, the bower of a satin bower bird.

Crikey! Three metres of killer reptile!

will leave you alone if you leave them alone". I'm no Steve Irwin, so leaving them alone was certainly high on my list of preferred actions, preferably leaving them alone by at least 10 m. All I can say is my relief was great to get past the snake unbitten and unsqueezed. That sort of excitement wouldn't have happened in the Tararua Ranges now would it?

AGM – Award winners and a change in Council

With so many kiwis at INTECOL we had a good turn out for the AGM and the applause was loud and deserved for our NZES Award winners Kath Dickinson, Mike Joy and Michelle Greenwood. Our award winners and their work is featured later in the newsletter.

Shona Myers came to the end of her time as President passing on the role to Bruce Burns. Mel Galbraith has taken on vice-President and Laura Young joins the Council. Clayson Howell (treasurer), Ruth Guthrie (secretary) and council members Chris Bycroft, Isobel Castro and John Sawyer were voted back into their respective roles. Shona of course stays on as immediate past-president, K.C. Burns continues at the helm of the Journal, as does Jon Sullivan as web master. It is a hard working team with some exciting times ahead—not least the revamp of the Society's image with the new logo and the long-awaited overhaul of our web site.

Introducing one of New Zealand's next top scientists

The subject of scientific fame, the iconic whio (blue duck). Photo: Amy Whitehead

Congratulations to **Amy Whitehead** from Canterbury University who is the 2009 overall runner-up in the MacDiarmid Young Scientist of the Year Awards and the winner of the Understanding Planet Earth category. The event "awards aspiring young scientists who are making a valuable contribution to New Zealand's scientific effort but also places a strong emphasis on the ability of our rising scientists to communicate to the world at large their work and it's value".

Amy's PhD research on the whio combines population and habitat surveys with computer modelling to assess whio numbers, habitat quality and the effectiveness of predator control programmes. Such research has direct applicability in the effective management of threatened species, and indeed Amy's research is at the core of the Department of Conservation's whio conservation strategy. You can read about Amy's whio research in this issue, and listen to Amy chatting to Kim Hill here: Amy chats with Kim Saturday Morning 29 August Well done Amy, it is awesome to see both an NZES member at the forefront of scientific endeavour, and smart conservation in the spotlight.

RECOGNISING AND AWARDING ECOLOGICAL RESEARCH AND EXCELLENCE

YOUNG SCIENTIST OF THE YEAR

Award Winning Research

Amy Whitehead is the 2009 overall runner-up in the MacDiarmid Young Scientist of the Year Awards and the winner of the Understanding Planet Earth category. Here Amy explains her whio research.

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Get more ducks for your bucks: Improving the effectiveness of threatened species conservation

New Zealand's natural heritage is an important part of our national identity but we risk losing iconic species if our conservation efforts are not effective. I have a strong passion for conservation in New Zealand and having witnessed the rapid decline of whio (blue duck) in Fiordland firsthand, I wanted to find out more about the threats that whio face and ways that we can improve their chances of surviving. These unique ducks were once common in many New Zealand rivers but their numbers have been declining rapidly in recent years. My research uses science to answer some important questions about whio conservation: 1) what are threats to whio populations, 2) how can we manage these threats, and 3) in

what types of habitat will whio conservation be most effective? This information will help mangers to get the most value from whio conservation, making sure that we don't lose whio from New Zealand rivers forever.

Monitoring whio nests with video cameras showed that stoats were the only introduced nest predators, often killing both the female duck and her eggs. Therefore, I expected that removing stoats should protect whio but would it be enough to prevent populations going extinct? Using mathematical models I found that trapping stoats led to a dramatic increase in duckling survival but, worryingly, current levels of management may not be enough to see whio populations persist long-term.

We know that current populations of whio have been reduced to a small part of their natural range because of stoats. I predicted the potential distribution of whio in the absence of stoats, showing that stoat predation has led to a catastrophic loss of whio habitat! But I also identified plenty of suitable whio habitat, if we can control stoats. This has enormous potential for whio conservation, allowing the expansion of whio populations outside their current range.

This is great news but conservation is expensive, so we need to make sure that predator control is applied in places that will benefit whio the most. To identify the best places to protect whio, I surveyed nine New Zealand rivers and looked at which habitats produce the most ducklings. Luckily for me, whio live in spectacular places, meaning I got to go tramping up rivers from Bay of Plenty to Fiordland. What a tough job! Populations with high duckling production occurred in warm, low gradient rivers with low rainfall. Protecting these faster growing populations could free up money for other conservation projects.

My research has shown that there is enormous potential for whio populations to expand, if we can control stoat numbers in productive habitats. By studying whio, I wanted to ensure that we don't lose these iconic birds from our mountain rivers forever, as well as developing methods to protect New Zealand's other threatened species.

A hard day in the field for Amy investigating whio habitat.

NZES AWARDS 2009

Congratulations to the 2009 winners of the NZES Annual Awards, presented at the AGM held at INTECOL10 in Brisbane on 18 September 2009.

Te Tohu Taiao – Award for Ecological Excellence

This award is presented annually to recognise individuals who have made outstanding contribution to the study and application of ecological science. The award is made to those who have published the best original research in ecology or those who have made the most outstanding contribution to applied ecology particularly conservation and management.

Professor Katharine J.M Dickinson
Ecology Programme and Department of Botany University of Otago, Dunedin

Katharine Dickinson first arrived in New Zealand in 1985 after completing a PhD supervised by Professor Jamie Kirkpatrick at the University of Tasmania. In New Zealand, she first worked as a Post-Doctoral Fellow at the University of Otago and immediately showed exceptionally high standards as a field ecologist with the completion, including publication, of a very challenging ecological study of the Umbrella Ecological District (ED) for the Protected Natural Areas Programme, within one year. This was achieved with such a high standard that she was retained by the Lands & Survey/Conservation Departments for the following year to survey the adjoining Nokomai ED. Following this she was Task Leader for the Vegetation and Survey Mapping Unit of the Australian Northern Territory Conservation Commission for two years. Kath then moved back to New Zealand as a Lecturer, followed by a Senior Lecturer in Plant Ecology at the School of

Biological Sciences, Victoria University of Wellington from 1989 to 1997. Kath was also Manager of the Ecology Teaching and Research Unit there from 1992 to 1997. In 1997 she returned to Otago University as Senior Lecturer in the Botany Department and Director of the Ecology Research Group. She was soon promoted to Associate Professor and, earlier in 2009, was made a full Professor.

Kath's exceptional talents as a university teacher, researcher, and mentor have been recognised at both Victoria and Otago Universities, as well as nationally. She received an Award for Special Academic Achievement in Teaching and Research at Victoria University both in 1991 and again in 1995, and a University of Otago Award for Teaching Excellence in 2007, as well as a National Tertiary Teaching Excellence Award for Sustained Excellence in the same year. Last year she was a Distinguished Scholar at DePauw University, Indiana, USA, and was also elected to membership of the Executive Committee of Ako Aotearoa National Academy of Tertiary Teaching Excellence.

Kath has had an equally distinctive involvement in ecological research and student supervision. She is well versed in both temperate and tropical environments and from coastal to high mountain ecosystems. She has worked in South America, Africa, Europe and the Asia-Pacific region, particularly Australia and New Zealand, with special interests in community ecology, conservation ecology, and mountain ecosystems with emphasis on plant-animal interactions and science communication. To date, she has published 75 peer-reviewed journal articles, three peer-reviewed book chapters and ten book reviews. In terms of student supervision, Katharine has directed over 30 post-graduate Masters and PhD students, and is currently supervising four Masters and six PhD students in various aspects of Ecology.

Kath's international standing is reflected by serving on the Editorial Board of the Chinese Journal of Applied and Environmental Biology and of the European-based journal Plant Ecology and Diversity. She is also an Invited Member of the Global Mountain Biodiversity Assessment Steering Committee of DIVERSITAS (an International programme of biodiversity science based in Paris).

Kath's academic record is outstanding and she is very deserving of this award for these reasons alone. However her special talents make her even more deserving—these include;

- Her extensive international networks.
- Her passion for putting people in touch with other people.
- Supervision of numerous Honours, MSc and PhD students, many who have become lifelong friends.
- Her support of students and colleagues both professionally and personally.
- Her care and concern for the Earth and people.

NZES Ecology in Action Award

This award recognises individuals who are achieving excellence and best practice in the promotion of ecology, including communication, education and transfer of ecological science at the grass roots.

Dr Mike Joy

Ecology Group, Institute of Natural Resources, Massey University, Palmerston North

Dr Mike Joy is an ideal candidate not only because he has been a tireless advocate for conservation of riverine systems and native fish populations for many years, but because he is also a shining example of how a high-quality ecological research programme can be applied to practical conservation management.

Mike is a Senior Lecturer in Ecology at Massey University in Palmerston North, where he has established a sophisticated research programme involving spatial modelling, predictive bioassessment modelling, environmental forecasting, and freshwater ecology. He is particularly well known for developing predictive models for spatial distributions of freshwater fish, employing state-of-the-art

analytical methods such as artificial neural networks. He has published 17 refereed publications since 2000, has been the senior author on the majority of these, and publishes in major international journals such as Freshwater Biology, Ecological Modelling, Ecological Applications as well as being a regular contributor to the New Zealand Journal of Marine and Freshwater Research.

In combination with these academic outputs, Mike has produced many reports for agencies involved in freshwater conservation, including four regional councils (Manawatu-Wanganui, Waikato, Wellington, Auckland), NIWA and the Department of Conservation. These have included surveys of fish populations and freshwater habitats, but more importantly have included application of his research to practical management tools, i.e., fish indices indexes of biotic integrity for several regions and a predictive model of fish occurrence called "Point-click-fish".

Most importantly, Mike has made a tremendous commitment to conservation advocacy via public talks, newspaper articles, radio and television interviews, and letters to politicians. He has also been an expert witness for nine different resource applications on behalf of conservation groups, iwi and himself. It is notable that all of this advocacy and legal work has been unpaid, is additional to his substantial workload as a Massey University academic, and is unlikely to contribute to career advancement. Furthermore, Mike's advocacy often runs counter to the interests of some resource users, but he has been prepared to criticise government bodies, and determined to bring issues to the fore.

Mike has been an avid advocate for threatened whitebait species, and his current goal is to have a rahui (moratorium) placed on commercial fishing of longfin eels. He is consistently speaking about longfin eels and issues associated with them to schools, public talks, university talks, marae, on television, in local newspapers, and weblogs.

NZES Award for Best Publication By a New Researcher

Dr Michelle Greenwood
University of Canterbury

For the paper:

Flooding Impacts on Responses of a Riparian Consumer to Cross-ecosystem Subsidies

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This article was published in:
Ecology 89*:1489-1486*

Landscape-driven processes impact the magnitude and direction of cross-ecosystem resource subsidies, but they may also control consumers' numerical and functional responses by altering habitat availability. We investigated effects of the interaction between habitat availability and subsidy level on populations of a riparian fishing spider, *Dolomedes aquaticus*, using a flood disturbance gradient in the Waimakariri River catchment, New Zealand. *D. aquaticus* predominantly eat aquatic prey as they hunt from the water surface. However, *D. aquaticus* biomass peaked at rivers with intermediate flood disturbance, rather than at less flood-prone rivers where the biomass of aquatic insect prey was markedly higher. Flooding positively influenced spider habitat quality, and an experimental manipulation at stable rivers indicated that unembedded cobbles, preferred *D. aquaticus* habitat, were a limiting factor, preventing response to the increased prey resource at stable sites. Potential terrestrial prey abundance was low, did not vary across the disturbance gradient, and is likely to have been a much smaller component of the fishing spiders' diet than aquatic insect prey. Thus landscape-driven factors not only controlled the magnitude of resource subsidies, but also influenced the ability of consumers to respond to them by altering the physical nature of the ecosystem boundary.

J S WATSON TRUST RECIPIENTS FOR 2009

More about the J S Watson Trust

The J S Watson Trust is administered by the Royal Forest and Bird Society and provides financial assistance for projects which advance knowledge of the conservation of New Zealand's flora, fauna and natural features by way of research, literary contribution, articles or general education of the public.

Congratulations to the successful applicants for 2009:

David Bradley	Assessing the value of acoustic anchoring as a conservation tool for New Zealand robins
Lucy Bridgman	Interactions between ship rats and house mice
Ilse Corkery	Does sharing a burrow with a seabird increase a tuatara's fitness
Gillian Dennis	Diphacinone poisoning in the short-tailed bat (*Mystacina tuberculata*)
Sol Heber	Translocations and the 'genetic rescue' of bottlenecked populations of the New Zealand robin
Bryce Masuda	How do translocations affect production and individual establishment in both source and founding populations of saddlebacks/tieke (*Philesturnus carunculatus carunculatus*)?
Stella McQueen	Taking the fish to the people – A guide to setting up education native fish displays
Rosmarie Muller	New survey techniques to detect jewelled gecko (*Naultinus gemmeus*) populations using ultra-sonic calls and artificial foliar retreats (AFRs)
Briana O'Brien	The removal of wilding conifers in the Wakatipu area
Georgina Pickerell	Interaction between water flow, island characteristics and predations risk by introduced mammals on the Rangitata River, South Canterbury: impacts on black-fronted fern breeding success
Chris and Brian Rance	Southland Community Nursery http://homepages.ihug.co.nz/-rances
Stephanie Shaw	Retrospective histological survey of amphibian specimens for the presence of *Batrachochytrium dendrobatidis* (Bd)
Karen Ann Stockin	Assessing recreational set net mortality in NZ common dolphins (*Delphinus* species)
John Sumich	Population establish success of North Island robin into a large predator controlled open sanctuary: an indicator of predator control of importance to translocations of other threatened species
Sheena Townsend	The relationship between inbreeding, heterozygosity and fitness in South Island robins (*Petroica australis*)
Sarah Wells	Phylogeny and conservation genetics of the endangered Chatham Island tui (*Prosthemodera novaeseelandiae chathamensis*)

INTECOL 2009

INTECOL10 2009: Some Keywords from an Applied Ecologist

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Biodiversity trajectories: The likely pressures on biodiversity from climate change was perhaps the most prevalent theme over the whole conference. Many papers described a looming biodiversity crisis in Australia, and others addressed efforts to assess the vulnerabilities of different elements of Australian biodiversity. There was also interest in pressures on common species, often more difficult to perceive. It was emphasised that climate change pressures were overlaid over all the other significant current human pressures on biodiversity, which were nowhere more acute than in the area around Brisbane, currently expanding its human population by about 1000 people per week. New Zealand ecologists took a leading role in the final conference communiqué taking a strong message about the need for action on climate change to world leaders attending the Copenhagen negotiations.

Resilience: There were many studies of processes on natural ecosystems that confer resilience, and of how humans interfere with those processes. It became apparent to me that we need much better understanding of ecosystem processes in soil, and how they may contribute to above-ground ecosystem resilience. This is especially important in terms of understanding the role of soil carbon in ecosystem responses to climate change. There was a sobering final plenary paper by David Lindenmayer (The Australian National University) on the tragic Victorian bush fires in February, when ecosystem properties that confer natural resilience come up against human values, and the response to the bush fires (further bush clearance, salvage logging, increased "hazard reduction" burning, etc) cause more significant effects on the resilience of the ecosystem than the fires themselves.

Optimising conservation opportunities: Bad news first: the most depressing possible critique of US waterways restoration projects, by Margaret Palmer (University of Maryland), listing a litany of failed biodiversity and nutrient reduction targets from billions of dollars spent: even the best planned projects yielded modest achievement at stupendous cost. There was better news from some of the Australian restoration scientists, but only through ruthless prioritisation and creative adaptive management projects that took full account of their land use, economic and social context. Much talk of market-based initiatives for conservation, but little hard evidence that these worked better or more fairly than old-fashioned prioritised grant applications. A provocative talk from Hugh Possingham (University of Queensland) weighed up conservation benefits from protection or restoration. He made the case that when land values were very high and there was a high extinction debt (the time-lag between an environmental perturbation and the consequent extinction of a species), restoration could be more cost-effective.

Bundling benefits: With so much conservation to do, there is lots of interest in optimising for more than one set of benefits (bundling). The most attention seemed focused on biodiversity conservation as well as carbon storage, mainly through reduction of deforestation and degradation (REDD). Some case studies showed that, on a regional scale, trading off a relatively small proportion of carbon storage benefits enabled much better biodiversity outcomes, i.e. optimised benefits overall. There was also discussion about optimising biodiversity, other ecosystem services and amenity benefits simultaneously (especially in urban areas). Bundling of benefits was also discussed in a social context, for example by cooperation and tradeoffs between similar conservation groups to achieve optimal gains for both.

Easy living: The messages were harsh but the conference was cruisey. Record August temperatures in Brisbane, Southbank lively and lovely, plenty of room to move, with 1300 ecologists barely making a dent in the vast Convention Centre. I have not mentioned any of the large number of New Zealand papers but I think they would have been a highlight for the northern hemisphere visitors. Well done to the NZES for its prominent role in organising and supporting this generally very successful conference.

BRINGING INTECOL TO YOU: FEATURING THE WORK OF NZES GRANT RECEIPIENTS

Alwyn Williams: awi23@student.canterbury.ac.nz (oral presentation)

Different arbuscular mycorrhiza communities effect the growth of *Podocarpus hallii* cuttings

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Colonisation by arbuscular mycorrhizal fungi (AMF) has been shown to improve growth and nutrient uptake of plants. Recent studies have demonstrated that different AMF communities result in changes in plant responses, especially when different plant species are grown in competition, highlighting the importance of specific AMF communities to enhance the performance of specific host species. This presentation reports interim results of a study aimed at quantifying the impacts of different AMF communities on the growth of a conifer, *Podocarpus hallii*, indigenous to New Zealand's South Island high country. The glasshouse-based experiment involved two grass treatments (+/- grass) and compared four AMF treatments – a commercially available strain of *Glomus intraradices*, a New Zealand strain of *Acaulospora laevis* isolated from an apple orchard, a mix inoculum of *G. intraradices* and *A. laevis,* and a sterile control. Plants were grown in a pasteurised high country soil within individual pots. Analysis of variance of relative shoot growth of cuttings revealed significant differences between AMF treatments. In the absence of grass, inoculation with *A. laevis* resulted in significantly greater growth than the other treatments; the commercial inoculums resulted in significantly less growth. When in competition with grass, inoculation with *G. intraradices,* caused the greatest increase in growth, though not significantly more so than *A. laevis*; sterile plants and those given the mix inoculum grew significantly less. These results highlight the host specific influence of AMF communities and demonstrate the importance of optimising AMF products, especially for use in what can be expensive tree planting programme.

Michael Cripps: michael_cripps@hotmail.com (oral presentation)

Enemy release, but no increased performance of *Cirsium arvense* in New Zealand

M.G. CRIPPS [1], G.R. EDWARDS [2], G.W. BOURDÔT [3], D.J. SAVILLE[4] AND S.V. FOWLER[5]
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Cirsium arvense (L.) Scop. (Californian, Canada, or creeping thistle) is an exotic perennial herb indigenous to Eurasia that successfully established in New Zealand (NZ) approximately 130 years ago. Presently, *C. arvense* is considered one of the worst invasive weeds in NZ arable and pastoral productions systems. The mechanism most commonly invoked to explain the apparent increased vigour of introduced weeds is release from natural enemies. The enemy release hypothesis (ERH) predicts that plants in an introduced range should experience reduced herbivory, particularly from specialists, and that release from this natural enemy pressure facilitates increased plant performance in the introduced range. In 2007 broad surveys were carried out in NZ and central Europe in order to quantify and compare growth characteristics of *C. arvense* in its native vs. introduced range. Additionally, permanent field plots were established in NZ and Europe where natural enemies were excluded with the use of insecticide and fungicide applications, and compared with controls (natural enemies present). From the broad surveys, significantly more endophagous herbivory was present in the native range compared to the introduced range, as predicted by the ERH. However, contrary to the ERH, no significant difference was found in plant population size, shoot density, shoot height, or biomass between the introduced and native range; furthermore, climate did not explain the variation in growth characteristics between ranges. Thus, although there is reduced specialist natural enemy pressure in NZ, the growth of *C. arvense* is not different from in its native range. Similarly, the permanent field plots in both ranges showed no differences among treatments in growth, or the proportion of shoots transitioning from vegetative to reproductive growth stages. Overall, the data presented here suggest that natural enemies may not be important for regulating the population dynamics of *C. arvense*.

Part of this work has been published:
Cripps, M.G., G.R. Edwards, N.W. Waipara, G.W. Bourdôt, D.J. Saville, S.V. Fowler. 2009. Does transmission of the rust pathogen, *Puccinia punctiformis*, require stem mining vectors? *Biocontrol Science and Technology 19:447-454.*
and a popular article is due to appear in the next issue of the NZ PROTECT *magazine.*

Kate McNutt: kmcnutt@doc.govt.nz

STANDARDISING BIODIVERSITY MONITORING METHODS

Supporting the New Zealand Department of Conservation national monitoring framework

Kate McNutt, Dr. Elaine Wright
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New Zealand

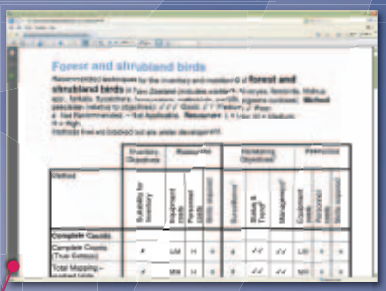
What issues face the New Zealand Department of Conservation (DOC) in managing natural heritage?

- DOC is responsible for managing, protecting and restoring natural heritage (ecosystems and species) on public conservation land (roughly one third of New Zealand) and in 33 marine reserves.
- Monitoring is essential for effective management of natural heritage. However, existing approaches to biodiversity monitoring are varied and the measurements used are inconsistent.
- Improved monitoring is essential not only for sound biodiversity management decisions, but also to ensure that stakeholders remain engaged, and to justify ongoing support for conservation.
- DOC's challenge is to develop a more comprehensive, standardised and responsive biodiversity monitoring and reporting framework.

A solution to national biodiversity monitoring and reporting

- The Natural Heritage Management System (NHMS) has been developed by DOC to prioritise natural heritage management actions and report on outcomes.
- Within NHMS, DOC has developed a national Inventory and Monitoring Framework. The Framework proposes a national sampling programme to monitor the trend and status of key biodiversity indicators.
- Central to this is the **Inventory and Monitoring Toolbox**.

Front page of Toolbox, as it appears on the DOC intranet, displaying different sections and modules



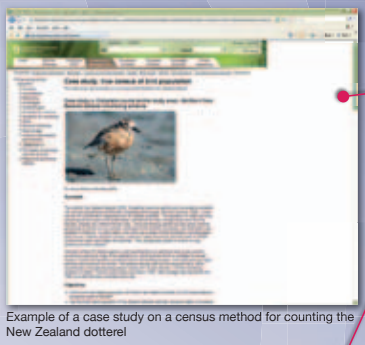
Comparative table for different methods of counting forest and shrubland birds

The Inventory and Monitoring Toolbox

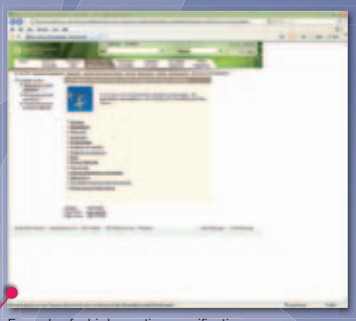
The Inventory and Monitoring Toolbox consists of nationally approved monitoring methods that can be applied at a range of scales by DOC. It provides for a process of evaluation to allow new and/or improved methods to be adopted by DOC. The toolbox includes training courses that require staff to meet minimum competency standards for some methods, before they undertake monitoring in the field.

More details on the Toolbox

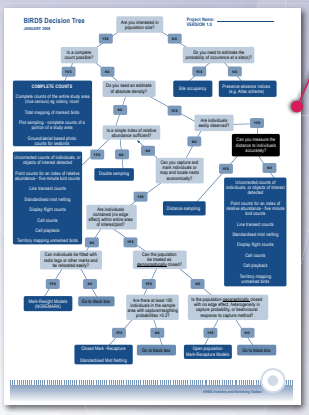
- It is available through DOC's internal Intranet.
- It has general reference material and guidelines on the principles of counting populations, sample design and basic statistical approaches.
- There are numerous tools to help staff to choose the methods that are most appropriate for their monitoring objectives. For example, tables summarise and compare the characteristics of methods; decision trees lead staff through a series of prompting questions to direct them towards the most appropriate method(s).
- Project Plans must be completed and approved by managers before new monitoring projects can begin. This is to ensure that Toolbox standards become embedded into DOC's every-day operational work.
- Minimum standards for each method are described and nested within modules (e.g. birds, bats, plants, animal pests, invertebrates, freshwater fish, herpetofauna).
- Specifications for each method are described, along with the method's advantages and disadvantages, assumptions, minimum attributes to record, resource and skill requirements, and data analysis procedures.



Example of a case study on a census method for counting the New Zealand dotterel



Example of a bird-counting specification



Example of a decision tree for bird monitoring methods

The future

- New modules and methods are being added regularly.
- Research initiatives support development of new methods and improvements to methods already in the Toolbox; e.g. programmes are underway to validate and calibrate monitoring methods for some bird species.
- The Toolbox will eventually include methods for monitoring the dynamics of populations (e.g. recruitment and mortality) and broader ecosystem standards (e.g. water quality).
- Steps are underway to make the Toolbox available on the Internet so that other organisations involved in biodiversity management in New Zealand can apply its methods and standards.

Department of Conservation
Te Papa Atawhai

Melanie Harsch: harschm@lincoln.ac.nz (oral presentation)

The paper is due to be published in Ecology Letters *at the end of the month.*

Are treelines advancing? A global meta-analysis of treeline response to climate warming

M.A. HARSCH, P.E. HULME, M.S. MCGLONE, R.P. DUNCAN

Treelines are temperature sensitive transition zones that are expected to respond to climate warming by advancing beyond their current position. Response to climate warming over the last century, however, has been mixed, with some treelines showing evidence of recruitment at higher altitudes and/or latitudes (advance) whereas others reveal no marked change in the upper limit of tree establishment. To explore this variation, we analysed a global dataset of 166 sites for which treeline dynamics had been recorded since 1900 AD. Advance was recorded at 52% of sites with only 1% reporting treeline recession. Treelines that experienced strong winter warming were more likely to have advanced, and treelines with a diffuse form were more likely to have advanced than those with an abrupt or krummholz form. Diffuse treelines may be more responsive to warming because they are more strongly growth limited, whereas other treeline forms may be subject to additional constraints.

Samantha Jamieson: jammy.sam@gmail.com (oral presentation)

Monitoring of New Zealand's restored sand dunes: are our native fauna being cared for?

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Coastal sand dunes are critically endangered ecosystems, supporting a wide variety of specialist native flora and fauna. They have declined significantly in the past century, due to coastal development and stabilisation using marram grass (*Ammophilia arenaria*). Interest in the restoration of dune ecosystems is becoming increasingly widespread throughout the country. Many groups have carried out small scale rehabilitations, but efforts are generally not monitored, and methods often fail to draw on the science of dune ecology.

In the present study, plant and animal biodiversity was sampled at sites under restoration with native plants, paired with nearby sites dominated by marram grass. Despite intensive investigation, species such as katipo spider (*Latrodectus katipo*), copper skink (*Oligosoma infropunctatum*), and common gecko (*Hoplodactylus maculatus*), thought to inhabit Wellington dunes, were not observed in either marram or restored dunes. Mouse population density was higher in marram dunes, as was population size of common skink, (*O. nigraplantare polychroma*). Although this can most likely be attributed to vegetation cover, it highlights the need for monitoring.

Restoration of dune ecosystems has the potential to benefit not only native flora, but threatened native fauna as well. Identifying biological change and adaptively managing the restoration process may be beneficial in identifying optimal habitat for fauna, but this approach is unfamiliar to the majority of practitioners. A survey of dune restoration practitioners is being conducted to reveal the reasons behind this, and to identify areas in need of improvement in New Zealands' otherwise healthy dune restoration movement. Analysis of invertebrate communities as a part of this investigation is also underway.

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Diagnosing biological specimens using real-time remote microscopy systems

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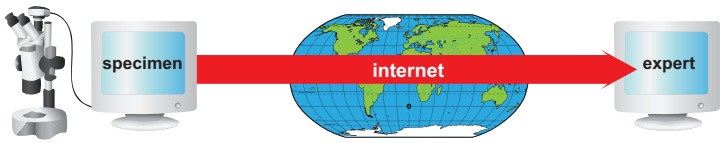

Introduction

A basic remote diagnostic microscopy system consists of a microscope with digital camera and monitor attached to a web server with suitable software. Live images of biological specimens may be transmitted through the internet for viewing and diagnosis. Benefits include: saving time and money, increased security of specimens, rapid identification and remote training. Some manufacturers, such as Nikon, offer proprietary hardware/software packages, but we have found suitable alternatives using a standard PC together with remote conferencing software (Figures 1–4).

Figure 1. EVO is free, and has perhaps the most complete list of desirable features, but is hampered by set-up difficulties and its non-intuitive user interface.

Figure 2. Mirial was the easiest to use of the systems tested, but had relatively poor image quality and lacks a remote pointer.

Figure 3. Webex had good image quality, but is relatively costly and challenging to use for remote diagnostics due to its lack of voice communication and a remote pointer.

Figure 4. Nikon's Digital Sight system had the best image quality, but lacks audio and a pointer. It was also the most expensive, requiring proprietary hardware and software.

Methods

A wide range of web-based technologies were reviewed for use in remote microscopy (Figures 1–4). Standardised tests were designed (Figure 5) to measure the image resolution (sharpness), colour resolution and latency (time delay) implicit in each system (Figures 6–8). These, together with actual diagnostic challenges using small insects (Figures 9 & 10), were tested between New Zealand, Australian and Canadian research organisations connected to the Kiwi Advanced Research and Education Network (KAREN).

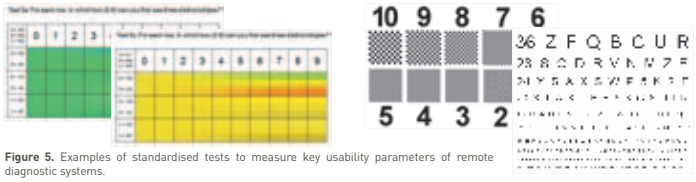

Figure 5. Examples of standardised tests to measure key usability parameters of remote diagnostic systems.

Figure 9. Live microscope images of aphids (body length < 3 mm) were transmitted via the KAREN network from the entomology laboratory to a taxonomic expert in an office off-site. Most features were transmitted sufficiently to positively identify all specimens.

Figure 10. Live images of spiders were clear enough to enable identification, but smaller features such as genitalia were of insufficient resolution to enable correct identification due to the lack of magnification power of the source microscope rather than the resolution and integrity of the transmitted images. A spider that had been intercepted by Biosecurity NZ was also examined remotely and identified as an undescribed Australian species.

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Results

Image resolution

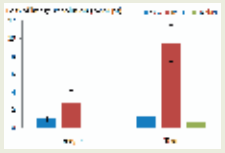

Figure 6. Webex had the best image resolution, with EVO a close second. Mirial's results were poor, probably due to image scaling at the receiving end. The same effect was not seen in either EVO or Webex. In similar tests, the Nikon Digital Sight system was found to have superior image resolution to the other three technologies.

Colour resolution

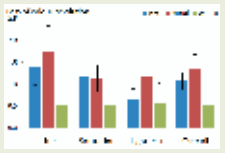

Figure 7. There were no significant differences between the systems in terms of colour resolution loss across the four diagnostic colours tested.

Image latency

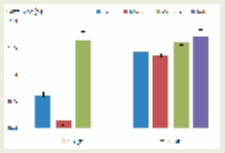

Figure 8. There was no difference in image latency between EVO and Mirial, whereas Webex was significantly slower. Action latency was similar in all systems, but slightly greater for Webex and Nikon Digital Sight.

Summary

The most important features of a good remote microscopy system were cost, ease of set-up and use, image quality, latency (or delay), vocal communication capability, and a remote pointer function.

We found that all four of the web-based technologies tested were suitable for remote diagnosis of large specimens, but there were difficulties with smaller specimens (< 3 mm).

The greatest impediment to adoption of remote microscopy for biosecurity applications is obtaining access to the internet software systems through institutional firewalls.

Lastly, many researchers feel apprehensive about undertaking diagnostic collaborations without a better understanding of the range of skills needed to set up and use the required equipment and programs. On-site coaching will help overcome this hurdle and foster greater levels of international collaboration through associated research and education networks.