Issue 13 September 2003

From the Editor

As Editor, I am pleased to be able to produce the following *RM Update* on MAF operational research projects as my last issue of RM Update. In the future, *RM Update* will be edited by Sharon Thurlow and Saphron Powell from the MAF Sustainable Resource Use team. Each year MAF commissions research which provides information to assist in policy development and implementation. This research is often of interest to those associated with the primary production sector. Results of this past research and details of current research can be accessed on the MAF website at: **www.maf.govt.nz/mafnet/rural-nz/research-and-development**. The following *RM Update* articles focus on recent operational research associated with sustainability issues.

Duane Redward, Editor

Intensive Cattle Grazing

This article by Duane Redward discusses an operational research project carried out by Alec Mackay, AgResearch and Tony Rhodes, Agriculture NewZeland on changes in cattle policies in the North Island and the environmental impact of intensive cattle policies.

Little information exists on the changes in cattle policies on rolling and hill land over recent years and the impact of these on the environment. This lack of information, combined with concerns over the environmental effect of intensive cattle grazing, prompted MAF Policy to commission research in 2001 into intensive cattle grazing systems.

Thirty producers were contacted, representing intensive dairy bull beef finishing, through to traditional beef breeding cow operations. The producers were farming a range of terrains from sedimentary or volcanic soils on rolling and hill land in the summer dry Central Hawkes Bay, to summer moist Rangitikei regions of the North Island. In one-on-one interviews, information was collected on the changes in farmers' cattle policies over the last 5- 10 years and likely future changes. Their assessment of the impact of the current cattle policy on soil erosion and soil and pasture damage was also recorded, as was the current management actions taken to limit any negative impacts. Comment was also sought on the long-term impacts of future intensification on the environment.

The survey found that cattle policies have intensified over the last 5 to 10 years in Hawkes Bay, as indicated by increased cattle-to-sheep ratios, stocking rates, growth rate targets and grazing management systems such as cell grazing. Rangitikei farmers appeared to have moved from breeding cows systems to younger cattle grown more intensively. Cows were managed more intensively in Hawkes Bay than Rangitikei.

Twenty-four of the 30 participants in the survey intend to continue with intensification of their cattle policies. All farmers had or were in the active process of implementing on-farm "land management practices."

With the exception of two, all participants in the survey assessed the short-term impact of their current cattle policy on the soils and pastures on

Inside...

the farm as minimal. The link between cattle treading and subsequent soil and pasture damage was viewed as weak and short-term in nature by the Central Hawkes Bay farmers. Individual participants in the Hawkes Bay group did, however, express concern regarding the long-term impacts of cattle treading on soil compaction, nutrient run-off to surface watercourses, on green house gas emissions and on pest plants.

Compared with the Central Hawkes Bay group, direct negative treading effects on soil and pastures was regarded by the land owners in the Rangitikei District as more serious, leading potentially to substantial loss of pasture production. Pads, sacrifice areas and cultivation to restore damaged areas were seen as an integral part of the strategy on many of the Rangitikei farms. Typically, these options tend to be focused on the consequences of the cattle policies, rather than the fundamental design and "fit" with the constraints of the resource. None of the participants had attempted to quantify the loss in pasture production following treading damage.

Half the participants in each group believed that more could be done to reduce the impacts of current practice and more would need to be done with continued intensification. Most participants identified increased knowledge as a critical success factor for the future. Time and money were identified as the barriers to gaining the additional knowledge. All participants indicated that the barrier to adoption could be reduced in situations where the dollar benefits of increased knowledge could be demonstrated.

Quantitative information on the impact of intensive cattle treading on the soil and pasture resource was assessed on nine of the survey farms in the two regions in the late winter and spring of 2001. Of the measurements made, producers were familiar with pasture cover and soil fertility status, but not those used for assessing soil or pasture damage. All nine-survey farms showed evidence of soil and pasture damage following cattle grazing. This was reflected in measurements of the amount of bare ground, macro-porosity and the soil indicators of the Visual Soil Assessment. At five of the nine sites the macro-porosity values were low (8.4-11%) on the undamaged area, suggesting the soils, which included both volcanic and sedimentary soils, were already under pressure from previous livestock policy and management. The loss of "soil physical condition" has the potential to reduce pasture growth, increase runoff and sediment losses, reduce infiltration rates and nutrient use efficiencies, and increase greenhouse gas emissions (i.e. nitrous oxide).

A number of recommendations are made in the report. The report indentifies several gaps in our current knowledge and points to where further support could be given to assist with managing treading effects as cattle systems continue to intensify. A structured survey is required on a national level or on at risk regions to collect data on the actual changes in cattle numbers and stocking rates. The long-term implications of ongoing intensification on the soils resource and wider environment require a more detailed analysis. The development of resource material to assist landowners in quantifying the effect of treading damage using the "new tools", and in evaluating systems design and refining management practices is needed. Documentation on the relative merits of the management options currently available for managing treading effects on the farms is required, with a focus on fundamental design and "fit" with the on-farm land resources. A series of case studies, examining the costs and benefits of managing treading effects, would provide a guide to future land use practices and new information on what are sustainable cattle stocking policies and management for rolling and hill land.

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MAF Policy Information and Regions

Duane has been employed by MAF for four years in the Hastings office. He is involved in Sustainable Land Management issues with a particular focus on erosion and biodiversity. In addition, Duane is involved in farm and pipfruit monitoring, pipfruit industry issues, primary sector taxation and is responsible for the production of RM Update.

Using Riparian Strips to Reduce Microbe Pollution

Rob Collins reports on operational research contracted by MAF to better understand the attenuation of microbes by riparian strips on farmland.

The faecal contamination of streams and rivers in New Zealand has raised concerns about a risk to public health. It can also restrict the recreational use of freshwaters and shellfish aquaculture in estuaries. The sources of faecal contamination of freshwaters are often diverse and can include point source discharges of industrial wastewaters and contamination by wild and feral animals.

There is, however, good evidence, both within New Zealand and internationally to indicate that grazing livestock are an important source of faecal contamination to freshwaters. This contamination of pastoral waterways is realised through the delivery of faecal material to a watercourse in overland and subsurface flows and, where livestock have access to a stream, direct deposition of faecal material.

There is a widespread perception that fencing to exclude livestock from stream channels and a proportion of riparian land is likely to be an effective measure in reducing faecal contamination by grazing cattle. Not only does this prevent the deposition of faecal material directly to streams and near channel contributing areas, but also the dense vegetation associated with riparian buffer strips (RBS) is likely to reduce the momentum of overland flow, promoting entrapment of faecal material (and other particulates).

While many studies of sediment and nutrient entrapment in RBS have been undertaken, the understanding of bacterial processes within them remains poor. For example, the trapping efficiency and its variation with overland flow rate is unknown, limiting the prediction of the optimal width of RBS for a given soil and slope.

In order to improve the understanding of the riparian attenuation of microbes, a field study has been conducted to determine the ability of sloping grass plots to trap and retain the faecal microbes Campylobacter and E. coli. The study involved a series of experiments whereby farm dairy effluent was flushed into the plots by overland flow. Outflow at the downslope end of each plot was then sampled for microbial analysis.

The grass plots were established on a sloping paddock (10-15°) on the AgResearch Ruakura campus farm, Hamilton. All plots were 2 m wide and either 5 m or 1 m long in a downslope direction. Half the plots had short grass (7-10 cm) to simulate recently grazed pasture, while the other half had long grass (23–37 cm) to simulate a grass buffer strip. Each plot was bound along its sides by sheet metal inserted approximately 5 cm into the soil, to minimise lateral flow of water out the plot.

During each experiment, water was applied to the top of each plot using a sprinkler system. Once the plots were saturated and overland flow generated, the water supply was temporarily turned off and 20 litres of liquid dairy farm effluent (with a known number of bacteria) quickly applied to the top of each plot. Once the application of effluent was complete the water supply was turned back for a further 40-60 minutes, enabling overland flow to wash down through the effluent, flushing the microbes into the plot. Overland flow at the downslope end of each plot was collected in a trough and sampled at regular intervals for microbial analysis.

Following the application of dairy effluent to the saturated plots, there was a rapid "first flush" of high Campylobacter and E. coli concentrations downslope (Figure 1). Peak concentrations occurred approximately 2.5 minutes (1 m plots) and 6-10 minutes (5 m plots) after effluent application began. Outflow concentrations thereafter typically decreased by 2-4 orders of magnitude over 40-60 minutes.

Plot length (in a downslope direction) had a clear impact, with the shorter length (1 m as compared to 5 m) increasing the rate of outflow and the peak microbial concentration, and reducing the time taken to reach peak concentration. These findings raise implications with respect to identifying a) the optimal width of RBS for microbial entrapment and b) the appropriate distance from streams for effluent discharges to land.

Grass height had no clear impact upon the magnitude and timing of peak microbial concentrations in outflow. This is attributed to a similarly dense vegetation mat (promoting similar entrapment properties) upon the soil surface, regardless of grass height.

The retention of bacteria was shown to be strongly dependent upon the rate of overland flow. At a low flow rate the plots were highly effective (> 95%) in trapping microbes within them. However, at a high flow rate entrapment efficiency typically fell to < 60 %. The trapping performance of buffer strips is therefore clearly dependent upon storm size and it may be that, during the very largest storms each year, entrapment of microbes falls effectively to zero.

Ongoing experiments under this project aim to determine microbial entrapment by RBS on a range of different soils and slopes, ultimately enabling riparian management guidelines to be drawn up with respect to the entrapment of microbes.

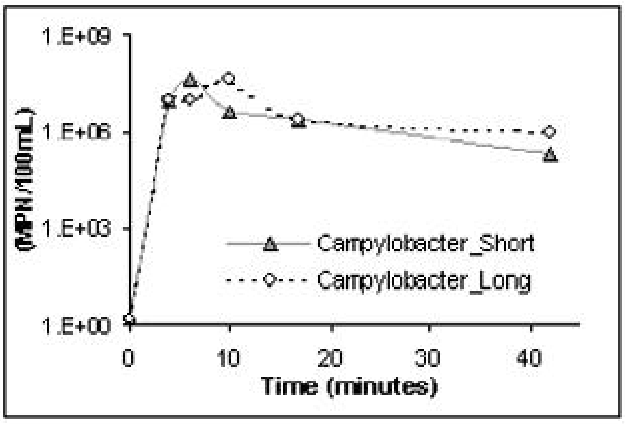

Figure 1. Campylobacter concentrations (Most Probable Number per 100 mL) in outflow from 5 m short and long grass plots. Units of time are minutes after effluent application began.

The 5 m long experimental plots

Rob Collins Senior Scientist NIWA.
Rob is a member of the Ecosystems Modelling group at NIWA in Hamilton, and specialises in field studies and computer modelling to determine the impact of land management practices upon bacterial water quality.

Sustainable Development Extension

In 2002, MAF published a report on Sustainable Development Extension. This investigated two issues - should Government intervene by funding extension in sustainable development, and if so, how? The following article by Phil Journeaux reports on the outcome of this work.

The first part of this question was addressed by the New Zealand Institute of Economic Research (NZIER), the second by Landcare Research. The researchers used three methods in approaching these issues:

Firstly a modified economic framework was used to show the trade-offs that government needs to make in efficiency, equity and intergenerational impacts. Secondly, emerging extension theory, collaborative learning theory and the case-study experiences of the researchers were used to identify the aims of, and need for, sustainable development extension. Thirdly, the current extension practices relating to environmental education and the roles of agencies involved were reviewed, and a model for sustainable development extension in New Zealand was developed.

In examining the case for government intervention, the researchers considered that Coase (1937) provided a sound platform for considering such interventions, which seek to persuade farmers to act in environmentally sustainable way using their own resources, rather than giving farmers direct assistance. In this way government would provide indirect assistance (through fostering the right approach, providing information, spreading education and some forms of technology transfer) rather than direct assistance (subsidies for planting trees).

The indirect assistance would need to specifically target environmental off-farm benefits so that the benefits are captured by the community either regionally or nationally. Furthermore, these benefits would have to be measured using an economic approach and set alongside the costs.

Policymakers would need to take into account the special characteristics of farming that separate it from other activities in the economy. Of importance is the scale of farming activities in New Zealand and the externalities associated with scale. The policy devised must take into account how the overriding financial and economic farming imperative interacts with farmer willingness to continue making improvements to the land that are consistent with government environmental policy objectives.

This requires that policy needs to be flexible and may be delivered differently in different regions depending on the environmental issues being addressed, the social and cultural make-up of the region and past history of interventions. Policies will also have to be flexible enough so as to take into account different environmental problems in different regions, different ways of delivering educational material and transferring technology, and different behavioural responses from farmers (from those suggested by economic first principles).

Co-ordination between central government and local government is an important ingredient in the success of any environmental extension process.

In determining how such extension could be carried out, the researchers noted that the emphasis placed on the development of flexible extension practice to support sustainable development information is mirrored by the move towards a more collaborative and learning-based model in contemporary extension. This model recognises that information is key to learning and subsequent behaviour change, but learning will only happen if it is supported by a number of social processes. These include a shared understanding, bounded conflict and a supportive environment. This, in turn, implies a need to ensure that the different interest groups have adequate capacity to participate in such processes. Therefore the public-good aspect of sustainable development refers to both task (getting sustainable development on-the-ground) and process (creating the conditions for sustainable development) outcomes. It is suggested that there are two key elements that must be improved to successfully develop an integrated information system to support the generation, provision and uptake of sustainable development information. These are:

- ensuring the development of information and information systems that are responsive to the needs of end-users; and
- creating a favourable social environment for the use of information to underpin constructive change.

In particular, it is noted that the constraints to achieving a more integrated approach to sustainable development extension are:

- Information and knowledge is fragmented.
- There is a lack of capacity to institute collaborative and learning-based approaches on a scale beyond that of individual groups.

There is a need to mainstream appropriate evaluation processes, including the indicators of success, both to support, and measure progress towards, such wide-scale collaborative approaches.

A copy of the full report is available on the MAF Website at: **www.maf.govt.nz/mafnet/rural-nz/people-and-their-issues/education/sustainable-development-extension/**

Phil Journeaux
Regional Team Leader,
MAF Policy Information and Regions.

Phil is Regional Team Leader for the North Region. His work involves a lot of liaison with the rural sector across all farming types. He oversees sustainable agriculture/RMA work in the region, and is involved in other projects such as micro-bugs in water and hill country issues. Phil co-ordinates the farm monitoring programme for the region, and oversees adverse events responses.

Farm Adjustment and Restructuring in the North Island Hill Country

This article by Tony Rhodes and Willie Smith reports on the second of a series of reports examining how North Island hill country farmers have responded to changes in conditions, and the consequent economic, social and environmental outcomes in their communities.

A previous study explored impediments to North Island hill country farmers in optimising economic and environmental performance (Impediments to Optimising the Economic and Environmental Performance of Agriculture; MAF Technical Paper 2000/17).

This current study examines the nature and extent of restructuring among hill farmers in the North Island. In particular, it evaluates the impediments to restructuring and the on-going changes in rural communities and service centres over the period 1986-2001.

The research focuses on three such communities – Taumaranui (Ruapehu District); Wairoa (Wairoa District); and Dannevirke (Tararua District). The approach adopted involved an extensive literature review, the use of a wide range of published and unpublished data and 39 interviews with farmers, ex-farmers, officials of Rural Support Trusts, and other agricultural experts. In addition, extensive interviews were conducted with teachers, local government officials, retailers and community workers to develop the community studies.

At the core of the major de-regulation of the economy, which started in 1984, was an attempt to redefine the role of the State in economic and social policy. As part of this, subsidies and support structures for agriculture were largely removed and the economy was exposed to the free-flow of global market forces. These changes were designed to improve efficiency and promote a more satisfactory pattern of resource use.

Since 1984, however, the New Zealand experience has highlighted the extent to which any explanation of the restructuring of the farm economy must go well beyond traditional, classical economic interpretations. The removal of farm subsidies, the free operation of market forces and price incentives has not led to the economically "rational" pattern of land use or to the extent of farm restructuring that had been anticipated. As this current study shows, some farmers respond quickly to economic signals and lack of profitability may lead to their restructuring their business or exiting the land. However, this appears to be a minority response. On the other hand, some farmers respond slowly to economic signals and remain on the land year after year, despite the economic pressures to quit. What the study points-out is the fact that many economically successful farmers also leave the land. Consequently, there is no evidence that a reliance on economic signals alone to promote restructuring or rationalisation is likely to gain the results desired, at least in the short to medium term.

An explanation appears to lie in the fact that each farmer attaches different values to their current lifestyle/land use and balances a range of different considerations against the cost of change – whether to their existing farm management system, or to exiting the land. Each farmer or farm household differently estimates the value of their farm business/lifestyle over a variable time period. These variations are shown to be not necessarily irrational perceptions or misinterpretations. Rather the evidence suggests that different farmers are acting entirely rationally (in an economic sense). Where the misunderstanding occurs is in the assumption that such rationality should rest simply on income levels. As described in the report, a range of tangible (and less tangible) factors are rationally built into the economic decision-making process, and discounted against anticipated long-term returns. At one level, at least, this is entirely consistent with conventional economic theory and the need in all investment decisions to address uncertainty and time in balancing potential risks against potential long-term gains.

However, the data presented also reflects that there are barriers to exiting the land, and that any effort to encourage more farmers to exit must address these concerns. The availability of local employment opportunities, information as to opportunities, and greater self-confidence among farmers as to their own range of skills would all help in this regard.

The report documents a substantial level of on-going restructuring in the hill country, with between one-quarter and one-third of all farmed land involved in some form of transaction in the previous six years. Clearly, restructuring takes different forms, and farmers and farm families follow different decision-making pathways and time frames. The range of responses illustrates the different circumstances, needs and perceptions of farmers. These in turn are shaped by family circumstances (including family structure and age distribution), as well as attachment to the property (for example, whether land is inherited or purchased by the current owner). But these features may also hide a myriad of other personal factors and individual characteristics. In effect, the report shows that the process of restructuring is not simple but takes many different forms that involve both economically "successful" and "unsuccessful" producers.

While the decisions of farmers can be understood within a narrow economic framework, the timing of change is intimately connected to the inseparable link between farms as business units and the business of investment in farmland. In this sense, rather than being pushed off the land, farmers can be seen as being pulled off the land by a diversity of forces. This link can explain the persistence of cash-flow-poor farmers on the land, where it might have been expected that they would decide to exit or restructure. More broadly, this finding leads to the suggested need to reconsider the assumption that low demand for agricultural products, signalled by low prices, is a trigger for restructuring.

In comparing the decisions and actions of farmers across the three study regions, the report concludes that differences in decision-making could be attributed more to the individual circumstances of farmers, rather than the community milieu in which they are embedded. For example, some farmers are perhaps one and a half hours from their nearest community. They send their children to boarding school five hours away, and shop at a major centre three hours distant. To them, the state of the local community is less relevant than to a comparable hill farm family, two miles from town, with young children who use local community facilities. For the latter, the need to switch to a service centre one hour away may "push" the family to quit the farm. In other words the state of the local community and the facilities available is not necessarily the prime determinant to exit the land, but taken in the overall context faced by the farm family, may be one of several determining factors.

In looking to the future, the report maintains that while there is a significant link between the health of the farming sector and the health of rural communities, an emerging issue relates to the role of education in maintaining the vibrancy of such communities. Access to good quality compulsory education up to Year 13 is identified as a key element in helping retain school-leavers in rural communities.

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Director
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Willie has a background in geography and policy. He has been based at the University of Auckland for the past 10 years. He worked previously as a Science Adviser for the Science Council of Canada, in Ottawa. His research focuses both on rural land use and the use of science in public policy.

Tony Rhodes
Agricultural Consultant
Wrightson
Dannevirke

Tony has been employed as an agricultural consultant since 1973, most of that time based in Dannevirke. He was actively involved with farmers and the rural community through the restructuring of the 1980s and the succession of drought events that have impacted on the East Coast. As well as his consultancy work, he has led extension programmes that have supported farmers in the process of change accompanying these events. Tony is currently a consultant with Wrightson Solutions Group in Dannevirke.

Silvicultural Management Guidelines for the Sustainable Management of Indigenous Forests

The following article by Alan Griffiths describes operational research undertaken by MAF on silviculture for indigenous forests.

Background

Since its establishment in 1993, the Indigenous Forestry Unit (IFU) of the Ministry of Agriculture and Forestry (MAF) has supported applied research into various aspects of indigenous forest management on private land. The goal of the many projects completed is to advance the breadth and depth of ecological and applied knowledge that will lead to better management of our indigenous forests. This is very much in keeping with the purpose of

Part IIIA of the Forests Act 1949, administered by the IFU:

"to promote the sustainable management of indigenous forest land".

One such project has been undertaken by Manaaki Whenua Landcare Research, Lincoln with funding from MAF Operational Research and the Foundation of Research, Science and Technology. . The goal of this research is to describe the variability within and between forests, understand the effects of disturbance on forest composition and structure and provide "a framework within which to structure forest management operations". Along with previous reports (from 1999), the research provides data on tree growth, forest structure and composition and exotic weeds in three forest types; Southland silver beech, Canterbury black beech and King Country tawa-podocarp forest. A further site (West Coast red-silver beech forest) has been studied in the 2002/03 year. The principal objective of this research is to:

"determine a set of general principles that can be used for ecological site classification of individual properties and present these as a set of guidelines for forest managers".

At the heart of the research is the recognition that "the achievement of sustainability criteria on individual properties will require site-specific knowledge and management protocols".

While the final report for this research is yet to be produced, Landcare Research has identified some general conclusions and principles:

Principles and Limitations of Site Classification

The classification of sites within a forest requires:

- definition of the management objectives for the forest that identify the range of forest values to be managed/ retained/enhanced;
- identification of factors (ecological and silvicultural) that influence these forest values;
- an understanding of the variation in those ecological drivers operating at large spatial and temporal scales and which are relevant to the management of individual properties; and
- an understanding of the processes operating at an individual property scale relevant to achieving sustainability criteria.

There are a number of ways in which site classification can benefit managers of indigenous forest land. For example, a simple management plan may apply a single growth rate to trees growing on a property, whereas a plan that is more sensitive to background natural processes will accommodate growth variation within and among stands. Our research has shown:

- elevation, soil fertility, topographic position, and species compositional patterns are important predictors of tree growth at the "plot" level; and
- a high percentage of the variation in individual tree basal area growth can be explained by the attributes of individual trees (e.g. local competition). This can be predicted by a competition index derived from measurements of the subject tree and trees within five metres proximity.

Research Findings and Implications for Forest Management

Tree growth response to management will be different on individual properties and for individual species.

Site Indicators / Plot Level Growth Predictors

In a Southland silver beech forest, vascular plant composition is the best predictor of stand level growth while in a tawa forest total soil nitrogen is the best predictor of tree growth. High total soil nitrogen sites have slow growth and this may be because increasing total soil nitrogen is strongly correlated with increasing soil carbon, and high soil carbon leads to unavailable forms of nitrogen. In the two beech forests studied growth is also positively influenced by larger plot level tree mean diameter, and negatively influenced by higher plot level basal area. Growth, vascular plant composition and soil fertility are all commonly related to one another.

Individual Tree Growth and Competition Indices

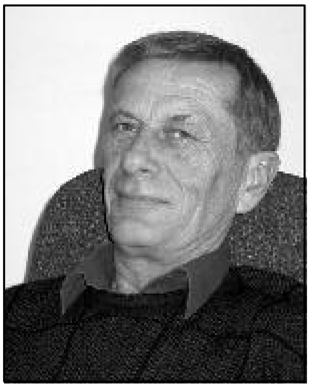
Total tree height, crown depth and basal area of trees within five metres are all good indicators of individual tree growth. Higher competition indices (basal area within five metres) indicate lower rates of growth, as expected. Significantly, for the two beech species (black and silver beech) crown volume, along with the competition index, incorporates the influence of all other significant variables. Crown volume is a simple measure of photosynthetic capacity and not surprisingly, strongly influences tree growth.

Response to Management

Stand changes (e.g., local competition and the size of trees) occur as a result of natural disturbances, both large and small scale (e.g. earthquake and storm damage), and human induced activity such as impacts of introduced pests and forest management activity. An understanding of forest dynamics on a range of sites is required to distinguish forest changes brought about by natural events from those induced by management. Some findings to date include:

- In small coupe trials in South Island beech forests, hard beech, silver beech and kamahi trees increase their growth in response to the creation of adjacent coupes. However red beech and quintinia do not. Although we have found growth suppression by local competition reduces growth it is not necessarily the case that competitive release will lead to an increase in growth.
- In mixed red-silver beech forest in Westland, significant variation in growth responses have also been identified within species. For example large red beech edge trees do not grow faster when adjacent trees are removed whereas small red beech trees do. All silver beech trees respond with faster growth, but particularly smaller trees.

The IFU anticipates that site classification will continue to be developed through applied research and incorporated into MAF Standards and Guidelines. The focus of IFU research promotion will continue to be on projects such as this one, that promise both expansion of our understanding of forest dynamics and management application.



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Indigenous Forestry Unit
Ministry of Agriculture and Forestry

Alan is currently the Manager Technical, Planning, Policy Liaison with the Indigenous Forestry Unit, MAF, Christchurch.. His background is as a professional forester with NZ Forest Service, NZ Forestry Corporation and as a forestry consultant. Alan's principal career interest has been in sustainable indigenous forest management and environmental forestry.

The Role of Productive Land in Biodiversity Conservation

The following article by Alan Reid, reports on a current project investigating the role of productive land use in biodiversity conservation.

Much of the focus of biodiversity conservation in New Zealand, and the work related to the New Zealand Biodiversity Strategy (NZBS), has been on indigenous forests, other vegetation types comprising wholly native plant species, and associated native habitats - the parts of our landscape harbouring the unique New Zealand flora and fauna. But well over half of New Zealand and much of the lowlands is devoted to productive lands, with a predominant cover of introduced grass, crop and tree species.

Balancing biodiversity conservation and sustainable use of natural resources is of increasing importance internationally. This is a primary concern of the Convention on Biological Diversity (CBD) to which New Zealand is a signatory. Equally we are concerned, as a trading nation with dependence on primary production, that our products are able to meet increasing scrutiny of the market on environmental standards. Unlike many other countries we rely largely on introduced species for our production while also emphasising the need to conserve indigenous biodiversity. Professor Steve Wratten of Lincoln University notes that, biodiversity, both indigenous and introduced, plays a vital role in providing ecosystem services in agriculture and horticulture. These services include pollination, biological control of pests and diseases, mineralisation of plant-based nutrients for re-cycling by crops and breakdown of toxins such as pesticides and pollutants.

In many areas of New Zealand individual farm properties carry production land in a mix with areas with indigenous vegetation. Conserving remnant indigenous vegetation, particularly areas of the poorly represented lowland forests and other plant associations, is important to achieving our national biodiversity conservation objectives. But while we focus on conserving remnants, it is also important to better understand the interactions that occur between different parts of the landscape. With this in mind MAF, has been keen to explore the contribution to biodiversity conservation from an overall mix of landscapes, including forest landscapes and habitats that are comprised predominantly of introduced species. These associations may often be mixes of both introduced and indigenous species; or may form part of corridor systems (fauna habitat); or other key systems such as riparian areas.

MAF considered that research was needed to clarify the contribution that managed productive landscapes can make to the conservation of indigenous biodiversity, particularly as landowners will become more involved through the development of the National Policy Statement on biodiversity.

Last year MAF commissioned research through Lincoln University to investigate the role of productive land use in biodiversity conservation. The project has two objectives involving farm properties and associated lands in Canterbury and Tairawhiti (East Coast).

1. Identifying agricultural biodiversity and assessing its functional role. This is concerned with conserving biological diversity directly involved in agricultural production and covers cropped land, pasture, margin habitats and non-cropped sites. It will measure bird and invertebrate populations and will consider values such as pollination, biological controls, shelter and erosion control.
2. Evaluating the actual and potential influence of production lands on the conservation and welfare of New Zealand biodiversity. It involves interactions between various parts of the landscape and modelling the aggregate contribution of production lands, including remnants and corridors, under a range of landscape scenarios. It will be useful in determining different techniques and approaches in biodiversity conservation.

At the time of writing the final report for the project is in preparation and MAF anticipates that it will provide a useful step in better understanding the interactions and values in the production landscape.

Alan Reid, Senior Policy Analyst,
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Alan has an MSc (Forestry) and has a background in forest management and planning with NZ Government in various NZ locations. Alan has also worked in urban forestry with the North Carolina state government and private companies in the USA. Alan is a member of the NZ Institute of Forestry and the NZ Farm Forestry Association.

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