conservation quorum

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The Soils of Gisborne

The Gisborne-East Cape area has many agricultural advantages: warm soil temperatures, relatively fertile soil, and a higher rainfall than the rest of the east coast of the North Island. Yet a century of settlement of the land by Europeans has been one long, hard struggle with the most unstable landscape in New Zealand. The soft rocks of the hill country made roading so difficult that even by the beginning of this century there was still no continuous road north of Gisborne.

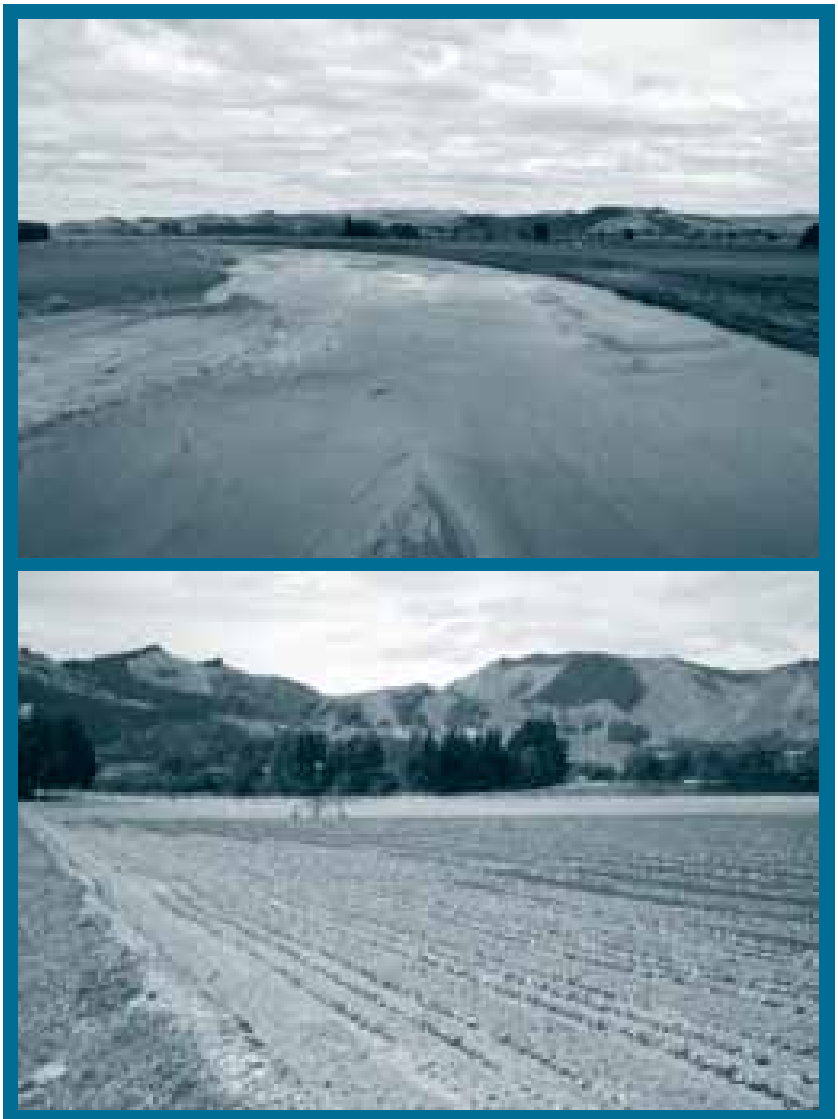

Figure 1: Waipaoa River and Plains.

The Plains

The Gisborne Plains around the lower Waipaoa River cover an area of over 20,000 ha, nearly 90% of which consists of young alluvium (Figure 1). These recent alluvial soils are all derived from the soft, calcareous sedimentary rocks of the upper catchment and together probably constitute the most naturally fertile large group of alluvial soils in the country.

Most of the cropping and horticulture on the Gisborne Plains and in the Tolaga Bay area occurs on Waipaoa, Matawhero and Waihirere soils. The Waipaoa soils are the youngest, having formed from deposits in the headwaters of the Waipaoa in the early 1930s. They are rather unusual compared with most of New Zealand's recent alluvial soils in that they contain high quantities of lime-bearing sediments. As a consequence they are slightly alkaline, contain high concentrations of calcium and shrink when dry, leading to poaching, caused by stock trampling in winter and cracking in summer. They contain most nutrients (except for magnesium) but are too young to

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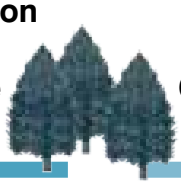

Editor
Sarah Harding

Contributing writers
Sarah Harding
Trevor Freeman
Louise Savage

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Gisborne District Council

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Te Rau Design & Print

Contributions
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Thanks to our advertisers, readers and contributors to this issue.

Address
The Editor
Conservation Quorum
PO Box 747
Gisborne
Email:
sarahha@gdc.govt.nz

Advertising
Contact the Editor

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From The Editors Desk...

Although it has been short lapse between this and the last edition of CQ, it seems like a lot has been happening in our district!
This edition of CQ has a variety of articles including information on the soils of Gisborne, development on hillsides or near streams and Gisborne City water supply. There are also our now regular articles on climate change and the latest garden escapee.

As you may have noticed from the cover page, Conservation Quorum has had a slight makeover. This new look now incorporates the recently modified Gisborne District Council brand.

The origins of the GDC brand are self evident. Nevertheless there is a story that it tells and a story to be told about it, especially concerning its form and colour.

The sun is new each day and as such is always fresh; a new beginning; and Te Tairāwhiti is the “first to see the sun”.
The sun also stands for longevity and is forever constant. It is dependable, energising, life-giving, healthy and clean.
The burnt orange colour is a sunrise colour and makes reference to the dawn when the sun first peeps over the horizon.
The seven rays of the sun in this logo parallel each of the district’s seven electoral wards and the semi-circle of the sun is Council itself. The shape of the rays recognises the region’s strong ocean-going navigation heritage as boat and waka silhouettes.

As waves, this icon highlights the district’s geographical fame and lifestyle. As a river it talks of our hinterland bringing its bounty to the port and the sea, and to the rest of the world. As a river it also gives recognition to the communities that form around each of our district’s great river systems and unites each of them at our shared shore line.

This form also represents land. The top part is a horizon line that curves around to form East Cape and winds down our coast line forming headlands and bays as it goes. The stylised koru shapes within these headlands and bays are our communities that have based themselves between the hill country and the sea.
The blue colour used here is a green blue based on the ocean colours found on our coast and at the Gisborne Port.

The Soils of Gisborne Continued from front page

have built up much organic matter. The Matawhero and Waihirere soils occur on the higher floodplain surfaces and are only rarely flooded. They are deep, friable and well drained with distinct organic topsoils. They cover 800 ha and are the best all-purpose soils of the plains because of their free drainage, good aeration and ample supply of most nutrients.

High winter water tables influence another 800 ha of the plains and have caused the formation of gleyed recent alluvial soils (Makaraka, Makauri and Kaiti soils) which require drainage for intensive uses.

The fertility of the Gisborne Plains is largely at the expense of the surrounding eroding country. The most dramatic accelerated erosion phase began in 1932 when aggradation increased 5 to 10 fold. In the next decade there were approximately 30 major floods which threatened Gisborne and severely disrupted agricultural development on the plains.

The Hill Country
This Gisborne-East Cape hill country of highly erodible tertiary mudstones and shattered argillites is drained by two major rivers, the Waiapu and the Waipaoa. The Waiapu drains the north-eastern slopes of the Raukumara Range through its two main tributaries, the Tapuaeroa and the Mata; it flows north-east past Ruatoria and Tikitiki while the Waipaoa

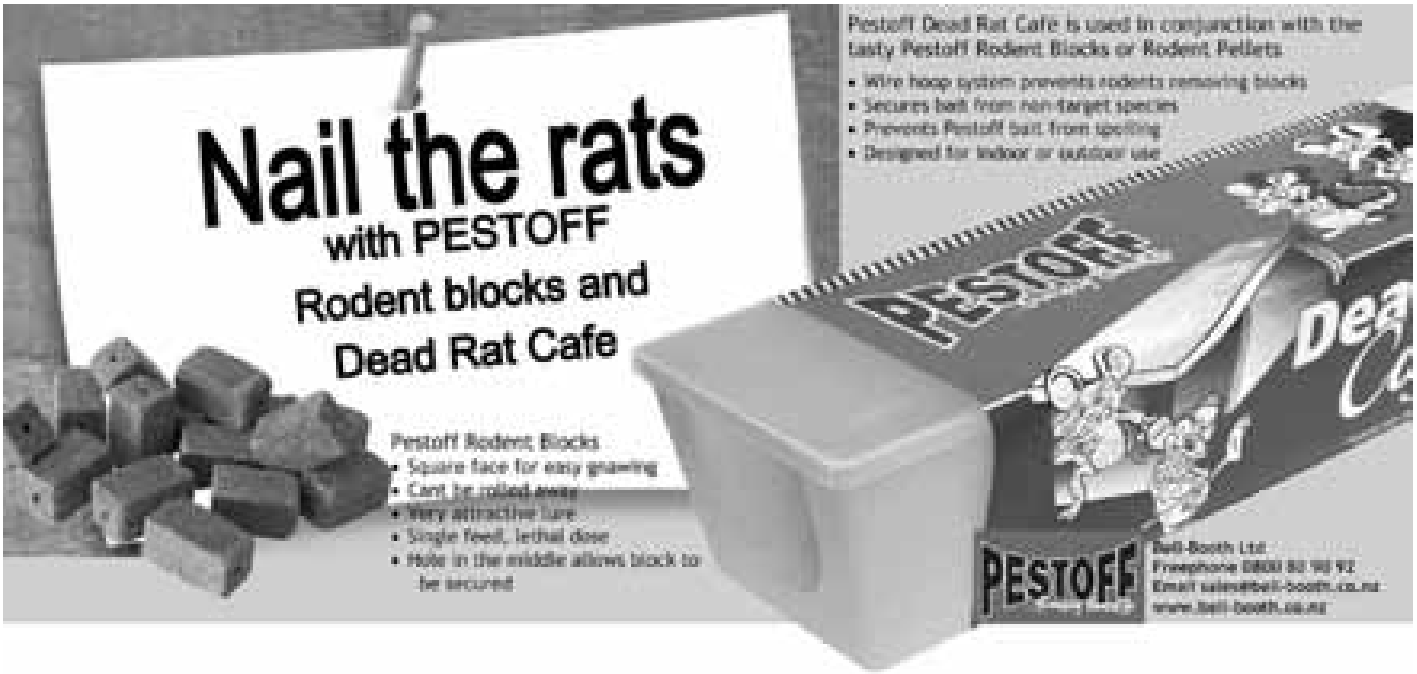
flows south-east to Gisborne and Poverty Bay. Both rivers have built up their floodplains at a spectacular rate following major deforestation in their headwaters during the last 60 years.

Erosion

The complex geology and relative abundance of erosion-prone lithologies in the Gisborne -East Coast region is reflected in a wide diversity of distinctive landscapes with different erosion susceptibilities, sustainable land-uses and land management options. Much of the region is degraded by erosion. Some is natural and some is accelerated erosion resulting from unwise land use and practices.

Figure 2: Tarndale Slip - erosion in the headwaters of the Waipaoa River where faulting has led to potentially unstable crush zones in the argillite rocks.

Figure 3: Erosion on a hill country station north of Gisborne



Gisborne City Water Supply

The Council provides many services to the Gisborne area, including the supply of clean drinking water to Gisborne ratepayers. The Utilities Department within Council is responsible for delivering the services of Wastewater, Trade Waste, Stormwater and Water Supply to both urban and rural Gisborne. The city water supply is managed by the Utilities Water Engineer with the operations conducted by 3 full time water treatment operators and 1 standby/relief operator.

The water supply for Gisborne City is more complicated than often realised. It involves water supply dams (Mangapoike dams); an intake on the Te Arai Stream; the Waingake water treatment plant; an intake and associated water treatment plant on the Waipaoa River; the Hansen and Cameron road emergency bores; the main reservoirs on Nob Hill, the old hospital site and on the hill adjacent to the new hospital; various small reservoirs; and the pipe work and various boost pump stations connecting these all together.

The Waingake water treatment plant is not far off the Waingake Road, set into the side of the hill just above the Te Arai River (see Figure 1). It was constructed in 1989, just after Cyclone Bola devastated sections of pipeline, choked the river with sediment and created a realisation that a modern treatment facility was required.

Figure 1: Waingake Plant.

The Waingake plant functions like a very large and sophisticated swimming pool filter and chlorinator. On average 85% of the water comes from the Te Arai River intake, the catchment servicing the Te Arai Stream covers an area of 1072.45 hectares (shown in Figure 2). The balance of the water is from storage, in dams, known as the Mangapoike Dams (see figure 3).

The water at the Waingake Plant is first held in settling tanks where a coagulant is used to assist in settling out any clay and silt particles held in suspension. The top fraction is taken off and flocculent added to bind together

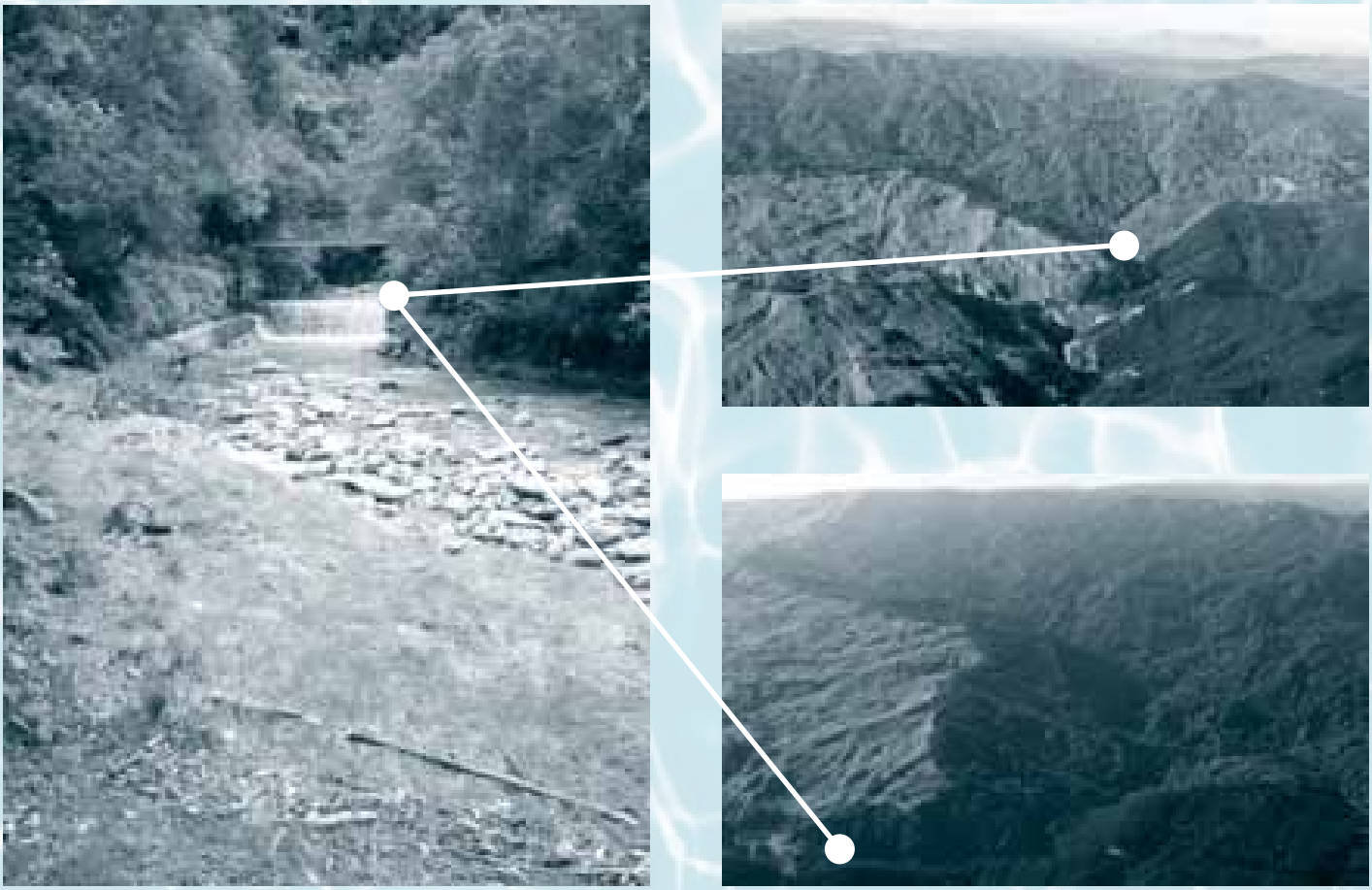


Figure 2: Te Arai Stream Intake & Bush Catchment.

the remaining very fine particles, which settle in the bottom of the tanks. The sediment component is spread on adjacent land. The water is then passed through sand filters that are "backwashed" at intervals, with the flushings going back into the river. The now clean water has Chlorine gas added for disinfection, and Flouride added to protect our teeth enamel. The pH is adjusted to 7.7 (slightly basic rather than acidic) so that the concrete lined steel pipes are not slowly corroded, and the water is then sent on its way. Of course it is rather more involved than this with a great deal of monitoring, checking, laboratory testing, automation and safety procedures required. The maximum output of the Waingake plant using the usual processes is 1,100m^3 per hour (26,400m^3 per day).

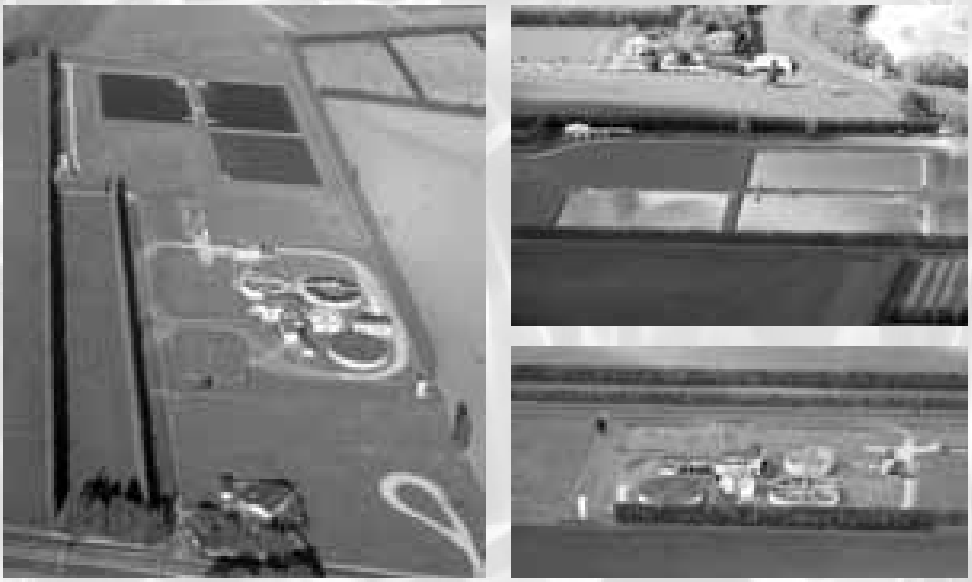


Figure 4: Waipaoa Augmentation Plant.

The Te Arai River catchment headwaters comprises dense native bush. This has provided the initial gravity fed supply of water to Gisborne from 1909 and is still the basic source for the city.

The Te Arai and Mangapoike catchments lie approximately in the same area, about 40km to the south west of Gisborne.

This year during the summer/dry season the Mangapoike dam levels were well below the 50 year drought curve and this meant that level 3 water restrictions were put in place. Water restrictions have now been lifted seeing as the dams have recovered enough and Council utilities staff expect a normal wet winter season. In fact June has been exceedingly wet!

The Mangapoike River Dam catchments comprise of land that was subject to widespread bush felling prior to being bought by the Council in the 1940's. This left the catchment with very sparse vegetation, which in an area of poor land stability, initially caused sediment deposition into the dams through episodes of erosion. This area is now regenerating rapidly with thick scrub and tree ferns which consequently makes the water supply notably cleaner.

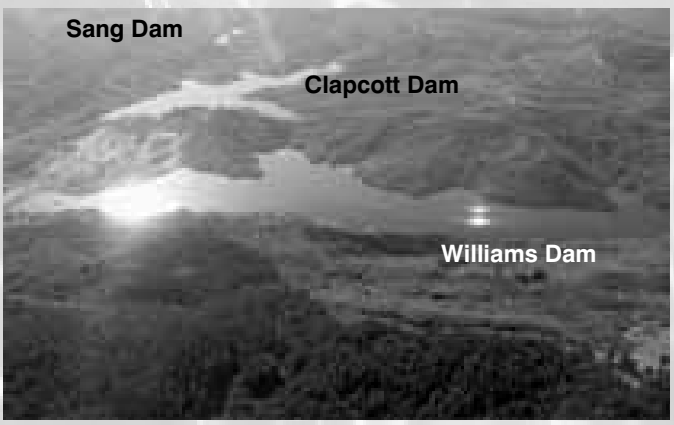


Figure 3: Mangapoike Dams.

An augmentation plant was needed to boost the city's water supply in periods of high consumption and in emergency situations. This also gives an important water supply source that is not reliant on the Te Arai Valley pipeline. This plant is commonly called the Waipaoa Plant and was constructed post Cyclone Bola.

The Waipaoa Plant (Figure 4) draws water from the Waipaoa River, which is initially held in two pre-sedimentation ponds. It goes through a conventional flocculation, coagulation, sedimentation, filtration process before chlorination and fluoridation for supply.

When maintenance work is carried out on the Waingake plant or if it is shut down for any reason, the Waipaoa plant can be used to supply the city & reservoirs. This Waipaoa plant has been needed when the pipeline has required emergency or maintenance work.

The city reservoirs make up the rest of the water supply to Gisborne city. This includes: Hospital Hill-Total Storage = 38,000 m^3, Nob Hill-Total Storage =8,800 m^3, Taumata -Total Storage = 3,300 m^3. Five additional satellite reservoirs are scattered around the city, designed to increase water pressure to high level households during peak draw-off.

Water quality is constantly monitored at the source, throughout the plant at various stages of the treatment process, and at various locations within the distribution networks to ensure that it meets strict standards for public health and the New Zealand Drinking Water standards.

Peter Fantham 31 years at Council

As mentioned in the autumn edition of Conservation Quorum, Peter Fantham (our most recent Senior Soil Conservator) has moved to Australia after 31 years of work at the Council. Here is a summarised version of his time spent here.

Peter (right) at his leaving party with Bob Back & Dave Sinclair from Hydro-Technologies.

Between 1973 and 1976 Peter completed a Bachelor in Agriculture at Massey University. As part of the course, summer holidays were spent working on sheep, beef, dairy and cropping farms throughout NZ so he had a good rural base which is so important in the field of soil conservation.

He was offered a position as 'Soil Conservation Officer' with the Poverty Bay Catchment Board in August 1977. In a display of enthusiasm he grandly offered to start on the 9th, straight after his honeymoon.

The job he found himself in included negotiating plans of erosion control for individual farmers; usually involving poplar and willow poles of various types and spacings, debris dams and blocks of pines. However the main part was arranging for these to happen: getting materials and men on-site: trucks, trailer, helicopter and lots of walking. Then supervision to ensure the work was up to standard. Followed by arranging payments to contractors and farmers.

As well as Farm Plans, Peter also helped out with land use capability mapping at a catchment scale, nursery planning and economic analysis.

In 1989 after Cyclone Bola, Peter project managed a large scale afforestation scheme for Council for four years. Something like 13,000ha of new plantings. Although very much a team effort Peter's co-ordination and experience with work programmes, contract management and budgeting ensured it was fully subscribed and under budget.

For the 1995/96 fire season Peter filled in very successfully as Principal Rural fire Officer in spite of knowing little of the role and having more or less clapped out equipment at his disposal.

Peter was appointed to the position of Senior Soil Conservator in 1996.

The emphasis on soil conservation works programmes changed with the demise of government subsidies and the introduction of new legislation; notably the RMA and Building Act. As required, Peter smoothly shifted into the altered approaches to sustainable land use, regulation, land monitoring, biodiversity, education and geotechnical assessments.

His particular interest and knowledge in geology has led to a carefully tuned assessment process for building developments on hill country that slots neatly into the requirement of the Building Section.

With respect to recent achievements, Peter has been heavily involved with pulling together the Overlay 3A mapping, including the contract mapping work involved in filling in the gaps between previous farm and catchment mapping to ensure district wide coverage. Also, for handling some of the more complex issues that have arisen; the most recent being the indigenous logging proposal at Mangatu.

Peter's knowledge of the district, long experience across a wide breadth of soil conservation activities and cheerful grin will be missed, but landowners can be assured plenty of experience remains within Council to ensure business as usual.

Afforestation Grant Scheme

The Afforestation Grant Scheme (AGS) is a contestable fund designed to encourage more planting of trees in small forests and on farms. It was announced last year by the Government as part of its package of climate change initiatives and offers an alternative to the Emissions Trading Scheme (Forestry) as a way to encourage greater levels of greenhouse gas absorption by increasing the area of Kyoto-compliant new forest in New Zealand.

Another objective of the AGS is to establish this new Kyoto-compliant forest in areas where it will help reduce the likely impacts of climate change and generate other environmental benefits, for example, where it will reduce erosion, nutrient leaching and flood peaks.

There are two funding components under the AGS. Half of the funding will be available to Regional Councils to help them meet their sustainable land management objectives. The other half is available to the general public via a public tender pool.

- The majority of this public funding pool (70 percent) will be allocated to species that have high sequestration rates. These will be the usual exotic plantation species such as Pinus radiata and Douglas fir.

- The remaining 30 percent of these public funds will be reserved for species with low carbon sequestration rates. This is a result of public interest in planting indigenous species, which have low carbon sequestration rates.

Gisborne District Council is one of the participating regional councils.

All growing forests accumulate (sequester) carbon which assists the government in meeting it's international climate change obligations, at least in the short to medium term. The scheme offers very attractive grants set at a high level for fast growing trees and a lower level for slower growing species such as indigenous species. Landowners have to plant a minimum of 5ha of land and enter into 10 year contracts.

For land to be eligible it must not also be entered into the NZ Emissions Trading Scheme, the Permanent Forest Sink Initiative, or the East Coast Forestry Project. The Afforestation Grant Scheme is therefore a useful mechanism for farmers to use to pay for all or most of the cost of establishing forests on lesser eroding, but still erosion prone land.

For the full guidelines and application forms, visit the Gisborne District Council's website:
www.gdc.govt.nz/afforestation-grant-scheme/

For Information on other climate change programmes, including the Emissions Trading Scheme (ETS) and the Permanent Forest Sink Initiative (PFSI) see
www.maf.govt.nz

The application closing dates are 31 March and 31 October. The provisional approval dates are 30 April and 30 November respectively.

Completed applications should be directed to The District Conservator, Gisborne District Council.

Tips for a more sustainable working environment

Many people express a desire to work in a "green" office but understanding exactly how to do that and the perceived costs involved are the major roadblocks to change.

- Set computers to energy-saving settings and always turn off your monitor and computer when not in use.
- Unplug printers and scanners when not in use.
- Use mugs rather than polystyrene cups.
- The greenest paper is no paper at all; however, if required, switch to using the "greenest" paper available. Made of 100% post-consumer waste, recycled, never-bleached paper, it is attractive enough for professional use and is becoming increasingly available.
- Use electronic mail rather than paper whenever possible. Email is faster, cheaper, and less resource intensive than overnight mail.
- Avoid materials that are highly toxic, heavily packaged, not recycled, or not recyclable. Cleansers and other everyday materials (insulation, paints, plastics, glues, carpets and fabrics) often contain dangerous chemicals.
- Retrofit lights with fixtures using much less energy. Generally, energy-efficient lighting upgrades increase lighting quality and yield 20% to 30% annual rates of return.

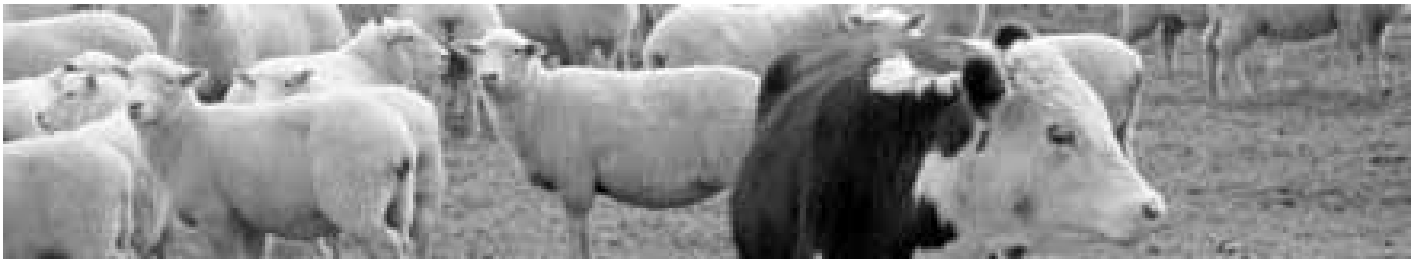
Winter Grazing Choices

Cattle

In winter we need to remember the numbers of parasitic larvae on pasture are peaking in May in most areas around New Zealand. How big this peak actually is, will depend on how good farm parasite control was over the previous few months.

For Cooperia worms we can expect the immune response to be reasonably well established in most dairy sourced cattle born last spring. Typically their egg counts will be starting to fall regardless of whether these animals are recently drenched or not. In some beef calves born a little later, the Cooperia problem may persist for another couple of months.

There is always some variation between animals, so if you have had a cattle parasite problem with a resultant high contamination rate of eggs onto pasture, and the inevitable conversion into infective larvae, then Cooperia is likely to be a possible problem until the end of winter.



In rising one year old cattle (R1), Ostertagia will generally be the dominant threat from early winter onwards, as cattle's immune response to Ostertagia is slower to develop.

In New Zealand we have not identified any ML-resistant Ostertagia as yet, so a straight ML drench i.e. ivermectin/ moxidectin/ abamectin type, is all that is required.

There is no one simple recommendation, as the necessity to drench will vary from farm to farm. If farms have kept larval levels low, then the peak will be low and drenching from mid-winter onwards should be of limited benefit.

Sheep

By now decisions for ewes and hogget feeding over winter will have already been made depending on whether farmers are using all grass, or specialised crops for winter grazing (i.e. brassica or green feed crop). Forward planning is essential along with monitoring animal live weights and body condition scores (BCS). Both should be routinely measured from late autumn onwards e.g. at scanning and during set stocking prior to pre lamb.

Needless to say farmers try to provide all classes of stock with the feed needed, in order to attain their specified targets. Ewe feeding is aimed at optimising healthy lambs and birth weight. Good feeding over pregnancy is essential and maintaining ewe condition in late pregnancy is a priority particularly for those ewes expected to bear multiples. A 60kg ewe at mating needs to be about 73kg the week before lambing, in order to maintain the same condition.

Sheep trial results on mid pregnancy feeding are contradictory. Some trials show no strong evidence of reduced lamb birth weight or lamb survival following under nutrition, whereas other trials showed under feeding in mid pregnancy can reduce the number of lambs born.

Over winter farmers, need to think about assessing their existing pasture covers and those required for lambing. Ideally ewe BCS at lambing should be in the range of >2.5 to 3.5, and pasture covers between 1200- 1400kg/DM/ha.

Ewe scanning results can be used to separate two tooth and mixed age ewes into single, twin and multiple bearing mobs. This allows differential feeding of stock and will help conserve and allocate feed to those mobs with the highest demands. After assessing scanning results a more accurate feed budget can be drawn up and feed deficits identified.

Scanning results can be useful for targeted drenching or anthelmintic treatments for the most at risk ewes or hoggets.

Research has shown that mixed age ewes and especially two tooth ewes carrying twin lambs are more susceptible than single bearing animals to parasitism, during the periparturient (or around birth) period.
Typically multiple bearing ewes have higher FEC (faecal egg counts) and lower live weights at weaning than those ewes raising single lambs. Well fed ewes during the periparturient period are able to overcome the effects of parasitism and typically have lower FECs, heavier body weights and in some cases heavier lambs at weaning, than their less well fed counterparts.

Over winter, farmers have the opportunity to accurately identify individual animals and groups to aid their farm management. To state the obvious if farms have an adequate feed supply, with ewes in the acceptable BCS range (of equal to or greater than 2.5), then parasites are going to have less impact, than those farms which are short of feed and have ewes in poor condition.

For further information:
Free-phone 0800 696 328
c/o Meat & Wool New Zealand, PO Box 121, Wellington
Email wormwise@meatandwoolnz.com
web www.wormwise.co.nz

An Update on Climate Change

What has changed since the last Gisborne Climate report in 2006?
The IPCC (the Intergovernmental Panel on Climate Change) released their Fourth Assessment Report in 2007, providing even stronger evidence than the Third Report of human-induced climate warming.

Findings include:

- The amount of water vapour in the atmosphere has increased since the 1980s.
- Melting of the Greenland and Antarctica ice sheets is very likely to have contributed to observed sea level rise from 1993 to 2003.
- Average Arctic temperatures have increased at twice the global rate over the past 100 years, and satellite data since 1978 reveals arctic sea ice has shrunk by 2.7% per decade.
- For permafrost areas in the Arctic latitudes, top-layer temperatures have increased since the 1980's by up to 3 degrees. The area of seasonally frozen ground has decreased by about 7% since 1900 (with a decrease in spring of up to 15%).
- Some areas of the globe have experienced a long-term (1900–2005) trend of increased precipitation (in eastern parts of North and South America, northern Europe and northern and central Asia). Meanwhile drying has been observed in the Sahel, Mediterranean, southern Africa and parts of southern Asia.
- Changes in precipitation and evaporation over the oceans are indicated by observations of freshening of mid- and high-latitude oceans and increasing saltiness in low-latitude oceans.
- Mid-latitude westerly winds have strengthened since the 1960s in both hemispheres.
- More intense and longer-lasting droughts have been observed over increasingly wider areas since the 1970s, particularly in the tropics and sub-tropics.
- The frequency of intense rainfall events has increased over most land areas.
- Cold days, cold nights and frosts have become less frequent, meanwhile hot days, hot nights and heat-waves have become more frequent.
- Cloud feedbacks remain the largest source of uncertainty as they produce both heating and cooling effects – depending on the cloud type.

Trends observed within New Zealand

- New Zealand is now producing 25% more greenhouse gases than in 1990.
- There has been a 58% rise in dairy cow numbers from 3.39 million to 5.28 million since 1990.
- Dairy cow numbers in Gisborne District have more than doubled since 1990.
- Sheep and beef cattle numbers have decreased, but since each individual animal produces more emissions than they did in 1990, the net effect is we're worse off.
- There are around 40,000 individual farms in New Zealand, and they generate about half of the country's greenhouse gas emissions.
- The planting of new production forests has slowed, and large areas formerly in exotic forest have been cut down and not replanted.
- New Zealand's population has increased since 1990 from 3.4 to an estimated 4.26 million in August 2008.
- We are further than ever from the goal of having 90% of energy generated from renewable sources: in 1999 72% of generation was renewable, but this had fallen to 66% in 2007.
- Greenhouse gas emissions from the generation of electricity rose by 138% from 1990 to 2006.
- Scientists at the Pastoral Greenhouse Gas Research Consortium announced they had mapped the genetic sequence of a microbe responsible for producing methane from the rumen of cattle and sheep.
- A solution, possibly in the form of a drench, vaccine or feedstuff, is probably at least five years away, and integration into farming practice is probably at least ten years away.
- On September the 10th 2008, legislation enabling the New Zealand Emissions Trading Scheme was passed.
- The ETS is a framework document, and is likely to be amended many times over the coming years, particularly in response to new developments in climate science.

Refer to Council's full report on our website:
www.gdc.govt.nz/climate-change-reports/

Elmore Station Field Day

Last month the local Meat & Wool NZ monitor farm-Elmore Station, had their annual field day. Conservation Quorum has been following Elmore Station on their progress on the Land Environment Plan (LEP) amongst other things.

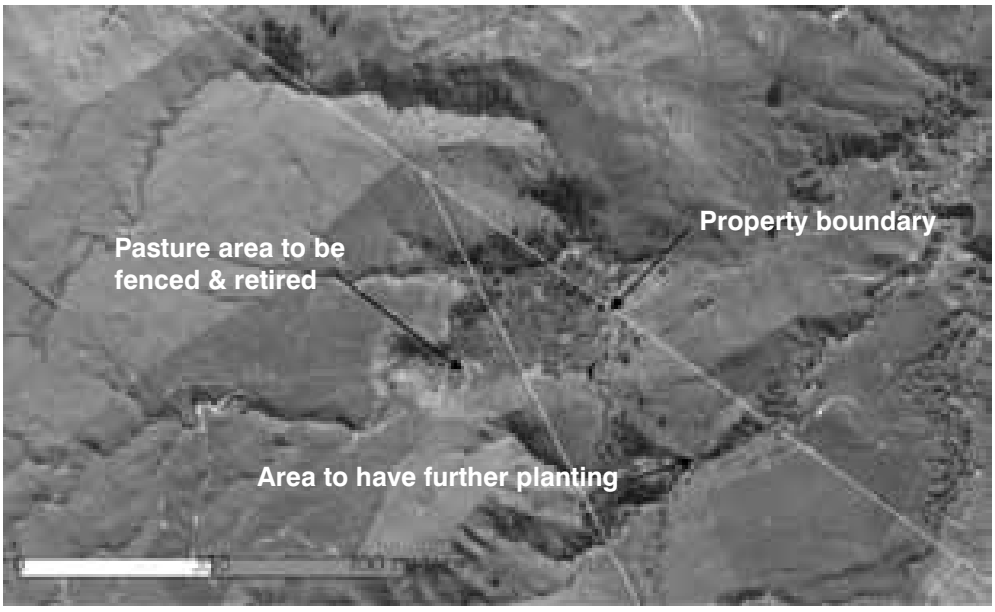


Figure One: The 'Goastville' paddock which is to be fenced and retired from pasture and the gully area which is planed to have further planting carried out in the future.

Although it was a rainy and cold day at Matawai, it did not deter more than 100 people from the rural community attending Ken & Kirsty Shaw's Elmore Station field day.

Community group members Kirsty Shaw and Sue Quilter from the environmental team discussed LEP's and noted that in the 2008- 2009 year the LEP plan for Elmore has taken a major step forward. The level 1 LEP Workbook has been completed which included a mapping project that was done by Kristy with the help of the programme Google-Earth and mapping which has been supplied by the Council for the relevant Land Use Classifications (this ranks the erosion risk for each paddock on the property). Also a risk assessment was completed by the subgroup. This covers: water quality, productive capability and erosion as well as other environmental issues.

One of the environmental options that has been put into the LEP has included the decision to retire and fence off some of their steep hill country block (Goatsville) shown below in Figure One, this area is an unproductive part of the farm. Although there is no 3A land mapped on Elmore Station, the Shaw's still plan to plant a gully area which is on their property boundary, adjacent to their neighbours 3A land. Other options in the LEP included preventing heavy stocking in wet areas of the farm in winter, avoiding excessive nitrogen application especially in winter and reducing stock access to waterways. These are all very simple measures to improve the environmental quality of the farm. Kirsty states that 'prevention is better than a cure' which really sums up the whole LEP process.

A LEP is a way of identifying farming practices that may be damaging to the resources which are necessary to continue to farm in the future. It also helps land owners come up with solutions to minimise the impact that farming has on these resources. It is a simple process which identifies a risk then suggests a response. Kirsty describes the LEP process as a 'simple stock take' of the farm and states that you need to know what you have on your farm in order to treat it.

The Land and Environmental Planning Tool Kit recognises each farm is unique in terms of landscapes, natural resources and farming practices. A LEP involves a stock take of land, soil and water resources on the farm. Generally it involves an assessment of environmental opportunities and risks and includes a plan showing WHAT actions are going to be undertaken, WHERE they are being targeted and WHEN they will be implemented. The Land and Environment Plan tool kit guides farmers through a step-by-step process to document the land and environmental issues on their farms and provides suggestions around what they should do to address them. A LEP can help identify areas where resources are not being fully utilised and production opportunities are being lost. A LEP assists farmers to make a plan ensuring farmland is managed sustainably, taking into account the specifics of soil type, fertility, pasture types, susceptibility to erosion and management practices. If a plan is written down with achievable time frames it is more likely to get done.

The Elmore Station environmental sub-group has set out clear and realistic goals to be carried out in the future and will continue the LEP process by completing level two.

You can download individual LEP files from www.meatandwoolnz.com/environment or obtain a hardcopy by phoning Meat & Wool New Zealand 0800 696 328 or email help@meatandwoolnz.com

Development on Hillsides or near Streams

Looking to build a house on a hillside or near a stream? Perhaps it only involves cutting into a bank and moving a few metres of soil?

It's not just a matter of calling in the bulldozer, and simply doing it as this could make it more difficult to get a building consent. The best idea is to call Council first instead.

It could be a stable, easy to prepare site, but if more tricky as on or near to unstable land or a river, certain processes need to be followed, says Soil Conservator Derek Birks.

"For such sites before any earthworks take place, a geological professional should have the opportunity to view the site, or conduct any required investigation work. This is required for any development on marginal land requiring building or subdivision consent – whether it's for a house, a subdivision or possibly even a farm shed."

Any building consent application on potentially unstable land needs to include a detailed site-specific geotechnical investigation report.

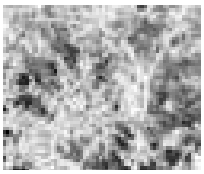
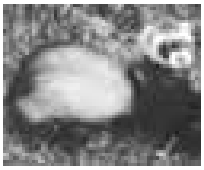
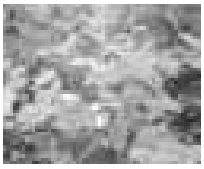
Derek says it is important for a geotech professional to have the opportunity to see a site in its natural state and study the land's physical features before the land is altered by earthworks.

"Modifying the site with cuts and filling can greatly increase the investigation and analysis required and affect the engineering recommendations made to make the site stable." Modifying a site with earthworks may also require a resource consent. This too should be considered before starting work. Land disturbance consents are usually free.

Council is responsible, under the Resource Management Act 1991 and the Building Act 2004, for ensuring that building development and subdivision either takes place on stable land, or good engineering solutions are in place to ensure buildings will not be affected by land instability.

Council sometimes seeks peer reviews of the geotech assessments to ensure that the land in question is suitable for building on. The need for peer reviews is based on the nature of the site and the complexity of the issues involved.

The District Plan has various rules which trigger the need for land disturbance consents. In some areas, this can be as small as a half metre cut over 20 metres, resulting in about 10 cubic metres of soil. In other areas, the trigger will be a greater volume of soil disturbance. Other rules come into play for natural and cultural heritage values. People also need to consider how stormwater will be managed during and after construction. All these rules are available at www.gdc.govt.nz or ring the Soil Conservators, ph 867 2049.

Proposed Regional Pest Management Strategy

Pests are organisms such as plants and animals that are not indigenous to New Zealand but which have become established here and threaten our health, indigenous plants and animals, heritage, or economy.

Management of plant pests or animal pests is important both for environmental and production reasons. For example, exotic plants are naturalising at a national rate of 10 – 15 new species per year. Although the number of new animal species moving into the wild is much less, existing ones continue to cause damage to New Zealand ecosystems.

The purpose of this Regional Pest Management Strategy ('the Strategy') is to provide for the efficient and effective assessment, management and/or eradication of pest plants and animals in the Gisborne District. The submissions for the 'strategy' have now closed and submitters will be heard at an upcoming hearing.

Below is a section from the draft 'Proposed Gisborne District Regional Pest Management Strategy' which discusses the assessment of 'Pest Risk' and 'Core and Satellite Infestations'.

Assessment of Pest Risk

There are several methods of estimating the risk posed by a particular organism. A common one is the Time/ Infestation Curve model that demonstrates basic pest population dynamics. It is the method most used by regional councils to help determine appropriate strategies and management programmes for individual pests.

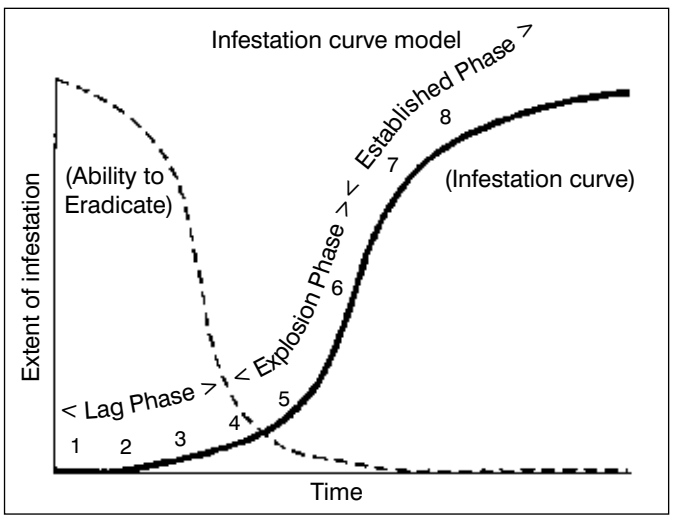


Figure 1: Time/Infestation Curve Model

This model is shown in Figure 1 (below left) and indicates three phases and eight zones:

- Lag – initial establishment (zones 1 – 3)
- Explosion – rapid increase (zones 4 - 6)
- Established – spread slows as available habitats fill (7 - 8)

Infestation Curve Model Zones		
Zone	Phase	Description
1	Lag	Not yet known in the district but present in neighbouring or nearby region.
2		1 – 5 sites known, but effects unknown or limited.
3		A number of sites (5-200 for pest plants) and effects quantified.
4	Explosion	Numerous sites (200+for pest plants), although still a small proportion of possible sites.
5		Noticeable expansion of range and/or density of infestation.
6		Widespread and continuing expansion of range and/or density.
7	Established	Common throughout most of expected habitat in the district.
8		Present in nearly every expected habitat.

Table 1: Infestation Curve Model Zones in the Gisborne District.

The lower a pest is on the curve the more likely it is to be controlled or eradicated cost-effectively.
Pests on the higher end of the curve include many of the common economic and some environmental pests (e.g. Californian thistle, possums, blackberry). Large scale eradication of these pests is difficult and expensive, with a high risk of failure. An exception is where biological control methods have proven successful.

Table 1 describes the infestation zones shown in Figure 1 as they relate to the Gisborne District.

Core and Satellite Infestations

When pest plants or animals establish within a region, they generally form an initial (core) population or infestation from which smaller surrounding (satellite) populations develop, as shown in Figure 2 (top left, page 13).

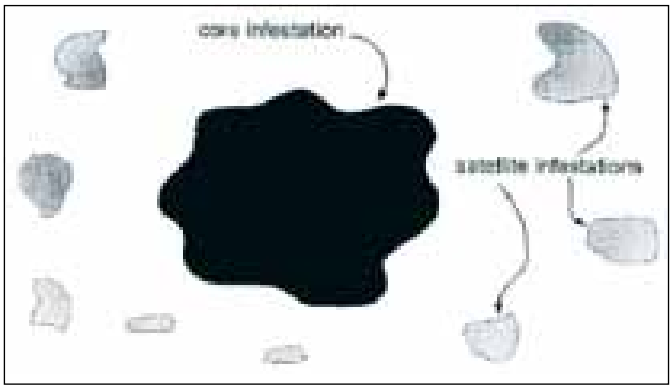


Figure 2: Core and Satellite Infestations.

Pest management strategies generally emphasise the value of controlling the smaller satellite populations and limiting further advancement from these, before controlling the core infestation. In the Gisborne District this basic theory of pest management could apply to controlling satellite populations of feral goats, woolly nightshade or banana passionfruit before controlling their core populations or infestations, because they are common but not widespread throughout the district.

Plant me instead . . .

Garden Escapee ✗

Pink Ragwort *(Senecio glastifolius)*

Herbaceous perennial growing to 1 metre tall with lacy foliage and pink daisy-like flowers followed by wind-spread seed. Invades a range of habitats, forming large infestations that crowd out desirable species.

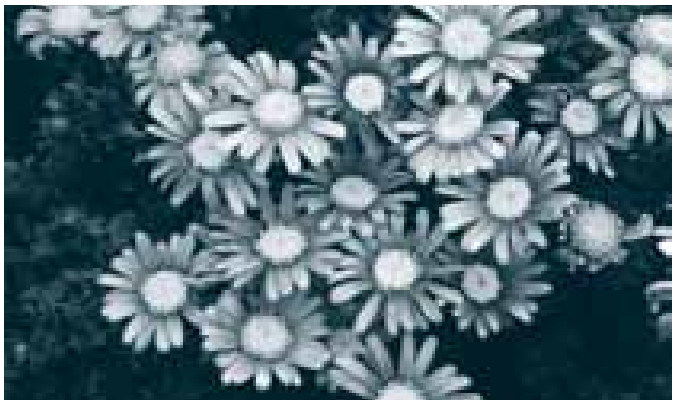
Plant Me Instead . . .

Hebe Cultivars ✔

C. Lewis

Also consider: *Leptospermum cultivars*

Kingfisher Daisy *(Felicia amelloides)* ✔



J. Liddle

Groundcovers and fillers

Poplar and Willow Breeding Programme

Willows and poplars have been the most widely used trees for planting in unstable hill country such as ours for a number of reasons. They establish readily from poles and cuttings in difficult environments and in the presence of domestic stock. New clones with superior characteristics such as improved disease resistance can be multiplied rapidly by hardwood cuttings in Council and private nurseries and by individual farmers. Their extensive and unique root network anchor unstable soils on slopes, and they strengthen riverbanks, thereby reducing the impacts of water movement on valuable productive land. Their high evapotranspiration rates during the growing season ease management problems in wet areas.

Willows and many poplars are also tolerant of flooding and periodically saturated soils. Their early growth rate is superior to all cool temperate trees with the exception of some Eucalyptus species. They are deciduous allowing pasture to be retained under the canopies while the foliage provides high quality herbage.

Poplars and willows are vital components of hillside erosion control, and willows are a vital component of riverbank protection. The conservation and protection values of poplar and willow trees are at risk from diseases such as rust and pests such as willow sawfly.

Our poplars and willows require an ongoing programme in breeding and research to retain adaptability and to minimise vulnerability to new diseases and climate conditions.

National Poplar and Willow Research Trust
The goal of New Zealand's poplar and willow breeding programme is to use hybridization and clonal selection to develop robust willow and poplar genetic material suitable for protecting erosion prone soils. Additional uses of this material include shelter, fodder, timber, bio-energy and bioremediation.

New Zealand's national breeding programme has provided many new genotypes for different purposes and with different adaptations suitable for particular regions of New Zealand over the past 30 years. While the focus has been on delivering trees with particular growth and productive characteristics, the arrival in New Zealand of new fungal diseases has highlighted the need to breed for resistance to new pests and diseases as well as existing ones, such as possums. We need a range of species and clones, not just a few favourites, to ensure long term persistence of willows and poplars.

The prime purpose of this long-term breeding programme is the continuous development and commercial release of new versatile plant varieties produced by breeding, supported by the scientific knowledge required for their successful performance. This research benefits enormously from continuity and alignment with international research programmes.

Poplar and Willow Gene Collection
An extensive collection of species enables a breeding programme to observe genetic expressions in the New Zealand environment, response to new diseases, and enables incorporation of desirable characteristics from different species into new hybrids which exhibit behaviours superior to the parents.

New Zealand has no natural willow or poplar populations so collections of known species are the best immediate genetic source. It is very costly to import new species into New Zealand, making it imperative that the genetic material present here already from earlier selected imports and previous breeding crosses is thoroughly documented and cared for carefully.

The gene pool is centred on Aokautere, Palmerston North, with other unique or duplicate resource material held at repositories in Pohangina, Hunterville, Gisborne, Nelson and Clyde.

Poplars and willows first started appearing in the country in the 1840's and new species introductions were frequent until the 1990's. The gene pool collection has been built up and maintained since the 1960's.

Many species have multiple different clones, and a number of clones are hybrids where one of the parents is not present in the New Zealand breeding gene pool. There is a surprising depth of genetic material in the gene pool:

	Species	Clones
Poplars	24	328
Tree Willows	15	113
Shrub & Oiser Willows	45	188+

The Breeding and Trialling Process
Both poplars and willows are either male or female. The gender of seedlings resulting from new crosses can be identified in 2-3 years for willows, and eight or more years for poplars. The selection process favours males in order to minimise the uncontrolled dispersal of viable seed, with its potential to create a pest problem. This is an issue with willows more than with poplars, so it is fortunate that identification can be made early in the selection process before new selections are distributed for field trails.

Parents are selected based on their desirable characteristics, and crosses are made under strictly controlled situations which make possible crosses not seen in nature because of geographical, or temporal isolation, e.g. flowering times are not synchronised.

Reproductive material is able to be collected from ramets (individual members of a clone) in New Zealand from around 8-9 years old. This is why it is important to secure 'safe' trees desired for breeding purposes, which are not going to be cut down or removed or in any way discarded. Not all species flower at the same time of the year, as a response to both climate and genetics. Poplars are sexed from the inflorescence (bunch of flowers) which does not develop until maturity. The inflorescences develop on one-year shoots usually located high in the canopy, so are identified using binoculars.

Dormant floral branches are collected in late winter when the tree has experienced 30-40 days of chilling and when floral and vegetative buds can be distinguished clearly. Chilling is used to ensure that the pollen is harvested prior to the female flowers' ripening. Male flowers release pollen (A), which is applied to the female flowers (B). Male floral branches are discarded following pollen collection. Female floral branches are potted in a suitable potting mix since time is required for the seeds to develop and mature following pollination. This process takes several weeks. The resulting seed is collected and planted in trays.

Seedlings are transferred into root trainers for the summer and are planted in the nursery the following winter.

Steps in the Breeding Process are as Follows:

1. An experimental cross is made between selected parents is made under controlled conditions.
2. Viable seed is collected and planted in trays in a greenhouse.
3. Seedlings are transplanted in root trainers for growing on.
4. After one year, all seedlings are labelled and planted out in the nursery to assess survival, vigour, form disease resistance etc.
5. The best 10% performers are selected after 1-2 years and bulked up to evaluate the inheritability of the characters.
6. A further selection occurs and the best <1% are field tested with already released clones at contrasting trail sites across New Zealand for upwards of 8-10 years (in the case of poplars).
7. Field tested clones are released to Regional Council nurseries for commercial propagation.

The Breeding Focus

The breeding focus has been on producing versatile and vigorous poplar and willow clones using a wide range of parent species together with importing tested clones. Selection has paid particular attention to the quantitatively determined traits listed below:

- Excellent tree vigour and form
- Pest and disease resistance, particularly rust disease
- Early bud burst and late leaf fall
- Wind tolerance
- Sex
- Low palatability to possums
- High rooting ability from unrooted stem cuttings
- Good performance in the nursery
- Timber potential rough bark
- Leaf shape and colour

From initial crossing to having each of the selection test completed, then bulking up for commercial use, takes 13 years.

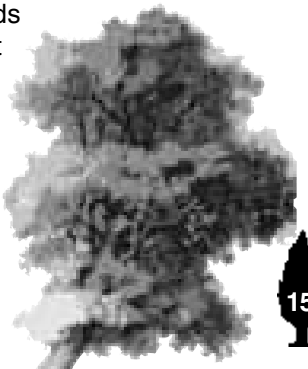
Continual improvement in these characteristics is required as poplars and willows are increasingly used for more diverse and often multiple purposes. This includes soil stabilisation, shade, fodder, timber and shelter, and minimising pasture reduction. Unfavourable characteristics may not emerge until maturity.

Funding and GDC's Involvement with the Programme

Financial support of the programme has fluctuated over the years making it difficult for the programme to operate at an optimum level. This has severely affected the breeding programme but the gene pool has been maintained – Just! Plant and Food Research have recently secured funding of $735,000 over four years from MAF. Regional Councils have agreed collectively to co-fund the same amount for the same period of time. This promises to rejuvenate willow and poplar breeding in New Zealand.

Gisborne District Council has been recognised as a 'medium use/need' and will contribute financially accordingly. GDC's District Conservator is a member of the New Zealand Poplar and Willow Trust tasked with administering the funds and promoting information about new poplar and willow varieties.

Conservation Quorum looks forward to new varieties becoming available through local trials, nursery plantings and production of poles. Watch this space!



THOSE WERE THE DAYS

Under the Highways Board's scheme all narrow cuttings and sharp bends in the district were dealt with before metalling commenced.

Straightening a dangerous corner at Mangatuna, near Tolaga Bay 1926.

Photographs courtesy Tairawhiti Museum