



The Deer Industry Environmental Management Code of Practice

2018



The Deer Industry Environmental
Management Code of Practice: 2018

Published March 2018.

ISBN 978-0-9941331-4-4 (print)
ISBN 978-0-9941331-5-1 (pdf)

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Cover photograph: Brian (late) and Jacqui Wellington,
Deer Industry Environment Awards – Elworthy Supreme
Environmental Award 2012

Acknowledgements

This handbook was produced by Deer Industry New Zealand (DINZ) as part of the Passion2Profit (P2P) strategy. P2P is a Primary Growth Partnership joint venture between DINZ and the Ministry for Primary Industries.

We would like to acknowledge the time and input by the people who have contributed to this edition of the New Zealand Deer Industry Environmental Management Code of Practice.

Lead authors and editors: Janet Gregory, NZ Landcare Trust; and Edmund Noonan, NZDFA.

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A special thanks to **Beef + Lamb New Zealand** for use of its Land and Environment Planning tools which is used by many deer farmers and which this document compliments.

Graphic design: Abby Davidson, NZ Landcare Trust.

Production: Phil Stewart, Words and Pictures and Brandt Ashley, Click Create.

Photography: Thanks to Janet Gregory, NZ Landcare Trust, DINZ, Grant Hasse and Vicki Patterson and others (you know who you are).

Scope

An Environmental Management Code of Practice for New Zealand deer farmers to mitigate potential environmental adverse effects from farming systems.

Mission statement

A code of environmental practices for deer farmers to assist in minimising or eliminating any adverse environment effects of deer farming and to enhance the long-term sustainability of the New Zealand deer farming industry.

The purpose of this Code

Deer farmers are strongly encouraged to read this Code and to apply it to their farm.

It is a practical guide to good environmental practice, based on farmer experience and the current state of environmental knowledge. As such, it is an essential resource for drawing up a Farm Environmental Plan (FEP) to meet the requirements of a growing number of regional councils.

The way we farm our deer is increasingly important to our fellow New Zealanders, the customers who buy our products and to the visitors who come to our beautiful country. They all expect our deer to be farmed responsibly – without harm to our land, lakes and waterways.

Having an FEP based on this Code and putting it into action is the best way to ensure that you are doing that.

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Foreword

“Deer farmers in New Zealand have a proud history of being proactive.”

These are the opening words to the Foreword of the 2012 edition of the New Zealand Deer Farmers' Landcare Manual. As the youngest pastoral industry in New Zealand at almost half a century, the deer industry can point to a number of environmental activities that demonstrate this proud history:

- The deer industry environmental awards were established in 2000 and are held every two years
- The publication of the first New Zealand Deer Farmers' Landcare Manual in 2004 based largely on the advice and practical experiences of 150 contributing deer farmers and regional councils and other sources of environmental expertise across the deer industry throughout New Zealand. This 3 year project was funded via the Sustainable Farming Fund, DINZ and the NZDFA
- The establishment of the first (Sustainable Farming Fund) industry focus farms in 2006 looking at water quality management. Key messages and principles were developed from this project
- Key research undertaken by AgResearch in 2009 confirmed deer farmer observations that managing wallowing and fence pacing as two 'critical source areas' would provide significant reductions in contaminant losses to water bodies
- The New Zealand Deer Farmers' Association (NZDFA) collaborated with Greater Wellington and other primary industry groups to produce "A Guide to Managing Stock Access to Waterways" in 2011
- The industry was involved in the creation of the "Industry-agreed Good Management Practices relating to water quality" published in April 2015
- A 2009 survey of high country deer farmers as well as a recent Landcare Research survey of rural decision makers (2015) both indicate a high level of awareness of environmental issues, management and expectation amongst deer farmers



- NZ Landcare Trust has produced a series of 15 videos showcasing deer farming practices for environmental management and actions to improve water quality
- Through the Passion2Profit programme (P2P) the industry has produced a series of Deer Fact Sheets including three environment topics (Wallowing and Feed Pad Run-off; Fence Pacing; Nutrient Management)
- P2P also facilitates farmer-led environment-focused Advance Parties. These groups are in addition to NZDFA Branch activities and community catchment groups in many areas
- In 2017 the deer industry via AgResearch commenced a five-year study on five deer farms, which aims to relate water quality and stream health to deer farming “good management practices”

All of these initiatives and those carried out by individual farmers have put the industry in good heart and provides confidence in our ability to farm profitably and responsibly. To date these have been focused and promoted within the industry. In our current social and political settings we now need to demonstrate to others how we manage deer sustainably. In many parts of the country this has already become a requirement under regional plan rules.

This Environmental Management Code of Practice is the next step for the industry on a path of continuously pushing ourselves to do better across all facets of deer farming and builds on our past successes.

This code uses material from the Landcare Manuals and the Fact Sheets, is organised consistent with the ‘Industry-agreed Good Management Practices relating to water quality’ booklet and is intended to be fully compatible with the Beef+Lamb New Zealand’s Land and Environment Plans or equivalent regional council Farm Environment Plans.

The code is about more than water quality management and is our industry statement about expectations of what our farmers need to be doing to minimise or mitigate farmed deer impacts on the environment as a whole.

We do not claim to have all the solutions and we do not expect that the code will be perfect from the outset. As with every other aspect of deer farming we fully expect to add to and refine the code over time as new technologies open up opportunities and previous “top end” approaches become standard practice.

We therefore welcome farmer feedback on how the code can be improved, what works well and what else should be covered in future editions.

However much we find ourselves facing increased challenges in today’s world, the message that the industry promoted in the first edition of the Landcare Manual remains as valid and as prescient today as it was then:

“Farming New Zealand’s land resources are a privilege that commands responsible management and stewardship for the future. We must perform. We must manage for sustainability.”



David Morgan, Chairman
New Zealand Deer Farmers’ Association.



Dr Ian Walker, Chairman
Deer Industry New Zealand Board.

Introduction:

Environmental Management Code of Practice

The NZ deer farming industry is taking the next step on from producing the 2012 Deer Farmers' Landcare Manual by producing an Environmental Management Code of Practice (EMCoP) to identify and document recommended Good Management Practice options.

Regulations and policies have been produced since 2012 that cover additional topics and tasks that farmers are required to undertake and include in their Farm Environment Plans (FEPs), particularly as more regional councils now require FEP auditing.

This EMCoP is aimed at providing Good Management Practices (GMPs) options that will help farmers in producing these FEPs meet regulations and, more importantly, implement on farm to improve water quality.

Increased awareness of on-farm practices and their influence on water quality is evident at local, national and international levels from the wider community and consumers. The public is also becoming aware of a planned concerted effort on farms to mitigate potential risks.

If we wish to maintain our social licence to farm, we must continue to provide proof not only of the intention to farm sustainably and within environmental boundaries, but also of the environmental GMPs implemented on farm. This can be done through FEP audits by a third party, or collection of data including water quality monitoring to show the gradual change that often occurs and the continual improvement we strive for.

This EMCoP can be used by deer farmers, rural professionals or local and central government personnel who wish to include guidance on GMPs for deer farmers in their plans. It includes identified risks within a whole farm systems approach and accepts that environmental GMPs underpin a commitment to sustainable business.

Our EMCoP is based on GMP options described in the Deer Farmers' Landcare Manual (2012) and the Deer Facts series produced by DINZ and also uses the Industry-agreed Good Management Practices Relating to Water Quality (2015) published by Environment Canterbury and developed jointly by six industry organisations. We have also considered the different categories within the B+LNZ Farm Environment Plan templates.

Sustainability risk

Deer farming systems, like those for sheep and cattle, have particular environmental risks. Deer behave differently, which can have specific impacts on soil and water impacting the farm environment. There are major deer behavioural influences on soil and water quality, but this is also influenced by management, soil types, terrain and climate, and can to some extent be mitigated.

There is also a responsibility on all farmers to preserve remaining indigenous bush and wetlands to maintain New Zealand's biodiversity.

Many deer farmers understand and manage these risks on farm and are starting to document them through compiling FEPs. This document provides an opportunity to share these examples and for farmers to utilise and adapt them to their own property needs.

Soil and water

One of the issues identified by deer farmers is fence pacing. This results in soil erosion which can often be severe. Excessive pacing along fence lines arises typically in response to behavioural stress or disturbance. Natural deer behaviour also includes play on banks and loose soil, wallowing and camping in areas that can become bare. Deer can also pug soils in wet weather.

These activities can result in a loss of production, but more critically in loss of soil, particularly in wet periods. This results in diminished water clarity through sediment transfer and loss of more phosphorus that adheres to soil particles entering waterways.

Deer have an affinity with water both in play and behaviour. They wallow in summer to keep cool, to help shed their winter coat in spring and for territory behaviour for stags in the rut.

In response, deer farmers limit deer access to waterways as part of GMP as well as meeting the wider public expectation related to good waterway management.

The EMCoP will help farmers develop farm plans by identifying agreed mitigation options and provide reassurance to the wider community that deer farmers are being proactive in improving water quality and implementing good environmental management practices.



Nutrient loss pathways

Nitrogen and phosphorus are two of the essential components of farm production. Their diffuse leakage from farming activities is primarily blamed for water quality degradation, including proliferation of algal blooms. These nutrients leave the farm and enter water bodies through different pathways.

Phosphorus tends to escape the farm in runoff events or overland flow when it is attached to soil particles during rainstorms. Nitrogen escapes mainly by passing through the soil and leaching into the water table in the form of nitrate.

Nitrogen loss from dairying systems originates from leachate leaving the base of cow urine patches, due to the high concentration and duration of a cow urinating. In contrast, deer excrete small urine deposits and they, like sheep, have a relatively low nitrogen leaching result. However, deer farming is characterised in nutrient loss models such as OVERSEER® as having a relatively high potential for phosphorus loss.

All farms can have hot spots for phosphorus loss known as critical source areas. Because phosphorus loss via soil loss is fairly visible, we see where to deal with it, and move to counteract that loss in practical ways. Nitrate losses are largely invisible.

Understanding deer behaviour

The key to avoiding environmental damage is understanding deer behaviour on farm – what activities occur, when and why. Social conditions can differ markedly from the wild. This can conflict with management needs at times, particularly during the rut, calving and weaning.

Thoughtful management, combining good management practices with environmental knowledge and genetic selection for good behaviour traits, reduces unwanted deer behaviours and controls environmental risks.



Farm Environment Plans (FEP)

Good Management Practice (GMP)

Identify the physical and biophysical characteristics of the farm system, assess the risk factors to water quality associated with the farm system and manage appropriately.

Maintain accurate and auditable records of annual farm inputs and outputs, and manage these.

Key points for consideration:

- Description of address, ownership, farm identifier, boundaries, contact person and legal description
- Identify and record all the biophysical resources i.e. land, soil and water resources of your farm, e.g. soil types, topography and climate
- Identify physical characteristics such as waterways, riparian areas, artificial drainage networks and irrigation
- Record offtal holes, silage pits, feed storage, effluent storage and application area, irrigation area, laneways and stock crossings.
- Identify and record all

potential risk factors such as soil loss, nutrient loss and damage to soil structure along with potential critical source loss

- Identify significant indigenous biodiversity
- Set out farm environment objectives to be met
- Identify all relevant farming activities and practices, including those that demonstrate that relevant GMPs are being applied
- Rank the risk in order of probability and potential consequences
- Identify how and when mitigation actions will be undertaken and by whom
- Keep accurate records of all inputs, timing and management practices
- Generate an OVERSEER® nutrient budget if required
- Check with local council rules
- Undertake an annual review



A Farm Environment Plan (FEP) is a tool for identifying key sustainability factors and risks and putting detail around how you plan on managing them. The plan is essentially a stock-take of land, soil and water resources, an assessment of opportunities and environmental risks and a map(s) of what and where the actions will be undertaken.

In some areas, an FEP is also known as a Land and Environment Plan (LEP), or a Farm Environmental Management Plan (FEMP). This EMCoP uses the term FEP for consistency.



The FEP identifies improvements in farming practice that will enhance production where resources are not being fully utilised. This provides a systematic approach to managing environmental impacts, to preserve the potential of soil and water resources and significant natural landscape features within a farm's economic limitations. Once completed, the FEP allows you then to prioritise activities and allocate a budget or resources.

The key to a good plan is to keep it simple, focused and relevant to your farm – “by you and for you”. While many farmers already do this informally, an FEP uses a clearly defined and recorded process of planning and implementation with scheduled timeframes and review, thereby providing clear evidence that measurable actions are being taken to address environmental concerns.

The essential elements are:

- Identifying and assessing the risks and opportunities of your farming activity.
- Developing a framework to manage this.
- Implementing the plan in practical and affordable stages.
- Demonstrating progress by recording against original intentions.
- Reviewing and adjusting the plan over time to improve farm sustainability.

The FEP approach tailors environment planning to individual farming situations across various stock classes. Farmers initially identify the key sustainability issues with a brief “do it yourself” property stocktake that includes resource care assessment including shelter plans, and a basic farm plan. They can then grow and develop the detail in stages to allow for successive improvements in quality.

For further details on the FEP system and to download an FEP template contact Beef+Lamb New Zealand (B+LNZ) or contact your local regional council for approved templates.

Land use capability mapping

GMP – Retire all Land Use Capability Class 8 land and either retire or actively manage all Class 7e land to ensure intensive soil conservation measures and practices are in place.

A useful tool in land risk management is a standards system that formally categorises and maps the different land types across the farm to identify and assess levels of risk.

Land Use Capability (LUC) is a nationally accepted classification system that groups land into eight classes for consistency in describing physical attributes of the land and provides a systematic way of classifying land based on the type of rock, soil, slope, erosion risk, moisture limitations and vegetation cover.

LUC is a systematic arrangement of different kinds of land according to those properties that determine its capacity for long-term sustained production. Capability is used in the sense of suitability for productive use or uses after taking into account the physical limitations of the land.

LUC mapping broadly classifies productive capability for land and soil types for each area of the farm, maps the strengths and weaknesses and defines appropriate land management options.

This information can provide additional detail for the property's FEP and enable various Land Management Units or Risk Zones (low, medium, high) to be designated on the FEP farm map.

Below left: Farmland on mixed LUC classes in the Wairarapa. Note Class 6 and 7 land in the background showing a mix of spaced tree plantings on slopes at risk of erosion, woodlot and riparian plantings. Additional management would include careful selection of stock classes and stocking rates on slopes at risk of erosion. (Photo courtesy of D Cameron, Greater Wellington Regional Council)

Below right: Canterbury high country Land Use Capability (LUC) Class 8 land. Due to the lack of vegetation cover, the presence of livestock will accelerate wind and water erosion. In the absence of feed or shelter there is also no productive value. (Photo courtesy of J Cuff, Environment Canterbury)



A Land Use Capability survey handbook on the methods and standards is available from Landcare Research. https://nzsss.science.org.nz/app/uploads/2016/04/luc_handbook.pdf

Integrated land management considers the natural character and capability of the land and the most appropriate land use options, matching them area-by-area and site-by-site. A well-integrated property, on variable topography and soil types, will probably be diversified with several integrated land uses. These typically involve deer, sheep, cattle, cropping and trees and sometimes conservation areas such as bush remnants, wetlands and waterways.

Below left: Well-vegetated Canterbury high

country tussock on Land Use Capability (LUC) Class 7e land. There is a risk of wind and water erosion of exposed soil if the vegetative cover is reduced. This risk can be managed by lightly stocking the land. Tussock provides good cover for fawning and hinds can spread out far enough to reduce disturbance and stress. (Photo courtesy of J Cuff, Environment Canterbury)

Below right: Farmland on LUC Class 7e land in the Waipa catchment, Waikato. While grazing is possible, sites where erosion risk is high have been allowed to regenerate back to native cover. This land is also unsuitable for heavy stock classes. (Photo courtesy of B Tikisetty, Waikato Regional Council)



Risk identification and assessment

Most properties are a mosaic of land and soil types, each with a different capability to withstand intensive deer farming. Risks are apparent when the capability limits of the property are under stress or exceeded, needing appropriate management responses. A risk assessment helps to recognise the areas and natural features of the property most vulnerable to the effects of deer farming activities and the conditions that may aggravate any problems. This can be developed by the farmer by accessing help from experienced deer farmers via the NZDFA or consulting the local council and land resource professionals.

Examples of risk areas may include:

- Natural features that are particularly vulnerable to damage, especially streams, ponds, wet areas, steep slopes, native bush, historic or archaeological features and certain soil types such as shallow and volcanic soils and heavy soils with clay pans
- Areas where damage is caused by deer that are unsettled by factors such as neighbouring activity from roads and houses, poor weather, lack of shelter and stock management factors including feeding, stocking density and social conditions
- Bad weather conditions, especially heavy rain, which contribute to damage through loss of soil, nutrients and sediment to waterways
- Impact from other enterprises on the property e.g. cattle, sheep, cropping or dairy grazing
- Farm layout, including tracks, yards, sheds, fences and gateways and other infrastructure, which affects how and where damage occurs
- Location of offal holes and silage pits can also be a major risk to water quality; these need to be carefully sited and meet council rules
- Variable water quality, which may be affected by nutrient leaching, faecal contamination or sedimentation

Environmental indicators

Characteristic indicators highlight farming practices not correctly integrated or best suited to the land's capability and that will affect sustainability. Responding to these indicators and changing farming practice to mitigate these risks is an integrated land management approach.

Environmental indicators of negative effects include:

- Persistent fence line erosion through fence pacing that recurs even after repairs
- Persistent hillside erosion that does not easily grass over
- Persistent erosion that is increasing in both depth and area
- Discoloured water flow in creeks when they are not in flood, indicating large amounts of sediment in creek bed or stream bank erosion
- Significant wetlands that are in a state of decline due to pressure from deer or land management such as drainage
- Significant bush areas that are in a state of decline due to pressure from deer
- Severe surface erosion or mass movement like slips, slumps and earthflows

Landuse options

The land owner's objective to farm deer has to be matched with the capability of the property, protection of its significant natural features and the farming regime and ratios of stock type best suited for it. Some deer farms surveyed have a large proportion of steep land that may not be suited for intensive deer farming. A dedicated deer unit that is intensively and sustainably farmed will tend to be on a land type that has the capability to withstand an intensive grazing regime, is relatively flat and sheltered and has well-drained soils.

Key management options to consider to optimise best land use for deer farming:

- Change stocking rate permanently or seasonally by changing the balance of deer classes such as young stock, breeding hinds, velvetting stags
- Integrate the appropriate stock types and land class to find the right sustainable balance for each land class and soil type
- Identify the best mix of stock types to fit the farm vegetation cover. e.g. pasture, shelter, woodlots, riparian margins and indigenous bush areas
- Intensify land uses on the best soils (low-risk zones) to reduce pressure on the sensitive areas (high-risk zones)
- Change to occasional deer grazing of sensitive areas like steep slopes and fragile soil types when conditions are most favourable, such as during flush growth periods and settled fine weather
- Change to occasional grazing of areas surrounding waterways, preferably with sheep only, to maintain a thick grass sward (if council rules allow stock grazing access in riparian areas)
- Consider permanent retirement from grazing of some or all areas of sensitive or erosion-prone land by fencing off and integrating production trees
- Develop a contingency plan for wet periods, snow or other adverse events, with a runoff block or sacrifice areas that are well sheltered with good draining soils
- Avoid using stock classes that play on bare soil on hillsides or rub bark off young unprotected trees



Integrated livestock management

Farming additional classes of stock is a very effective landcare tool to manage soil erosion, maintain pasture quality and seasonal balancing of feed demand and supply, and to spread income risks.

A mixed livestock system adds some complexity, needing additional labour and a wider range of management skills. More information is also needed on infection and parasite transmission.

However, there are real advantages in sustainability and profitability to be gained from balanced management of other grazing livestock species within the deer farm area.

Benefits of a mixed livestock system:

- At risk, steep erosion-prone areas are better managed by grazing stock like sheep
- Fence pacing can be reduced when mobs are separated by other stock grazing in paddocks in between them or by double fencing of shelterbelts
- Vegetation is retained or recovered in areas worn by deer, as rotation time increases

- Overall stocking rate of deer is reduced, providing for small mobs or more paddocks in the rotation. This has additional value during wet weather
- Fertility is transferred by other classes of stock grazing areas that deer avoid, for example, areas by the road
- Pastures have lower parasite levels from alternate grazing of stock classes, meaning high performance at high stocking rates with potentially less drench reliance
- Pasture quality is fully utilised. Examples include using beef cows to graze low quality feed in late autumn/early winter and using sheep to utilise spring flush allowing lambs to be finished before they compete with hinds and fawns for quality feed
- Feed pressure periods are reduced with less stock requiring priority feed when nutritional demand is critical for profitability, for both breeding hinds and ewes
- Weeds are better controlled, as sheep eat ragwort and winter cress that cause problems for deer-only systems
- Animal health outcomes can be enhanced. For example different stock classes have different risk profiles for Johne's disease



Risk response plan

As part of good contingency business planning for your farm environment it is prudent to identify the different climatic risks and associated mitigations and include these in your FEP e.g. snow, rain, wind, flood and drought, and how the event may impact on the property both short and long term. The purpose of the risk identification step is to “generate a comprehensive list of risks based on those events that might create, enhance, prevent, degrade, accelerate or delay the achievement of objectives”.

Risk assessment matrix

A risk management matrix is a simple way to increase visibility of risk and to assist and prioritise management and decision making. Various risk levels are defined based on the probability and likely severity of harm.

Severity of risk is often defined as the probability and extent of harm under any number of potential environmental risk conditions. This transition from mild to severe or extreme is best expressed in a formal risk assessment matrix that is specific to your property and unique farming conditions.

Severity/Consequences

Descriptor	Examples
Insignificant	Very little evidence of environmental harm
Minor	Insignificant visual evidence of environmental harm
Moderate	Short term environmental harm
Major	Medium to major long term environmental harm
Severe	Major long term environmental harm

Probability/Likelihood

Descriptor	Examples
Almost certain	Is expected to occur in most circumstances
Likely	Will probably occur in most circumstances
Possible	Could occur at some time
Unlikely	Not likely to occur in normal circumstances
Rare	May occur only in exceptional circumstances

Risk Assessment Matrix

Probability/ Likelihood	Severity/Consequences				
	Insignificant	Minor	Moderate	Major	Severe
Almost certain	Medium	High	High	Very high	Very high
Likely	Medium	Medium	High	High	Very high
Possible	Low	Medium	High	High	Very high
Unlikely	Low	Low	Medium	Medium	High
Rare	Low	Low	Medium	Medium	Medium

Records



Critical elements of this GMP are to:

- Maintain accurate and auditable records that set out objectives to be met
- Identify all relevant farming activities and practices, including those that demonstrate that relevant GMPs are being applied
- Demonstrate the assessment of all risks to water quality
- Identify how and when actions to mitigate risks will be undertaken
- Allow the generation of an OVERSEER® nutrient budget

It is important to keep good records, not only of the farm history (management decisions, fertiliser and other farm inputs). These are also critical for traceability and adding credibility and accuracy for the venison and velvet processors that you use and for them in turn to be able to confidently meet market requirements.

Farm records will include such things as:

- Production: nutrient management, supplements fed or applied, feed management and animal health plans and veterinary and routine animal health procedures
- Environmental management: soil erosion, water monitoring data, riparian fencing and planting, shelter planting, maintenance of plantings, weed and pest control with associated controlled species and figures
- Climate/weather: rainfall, flood or snow events

The records could also include a series of set photopoints where photos are taken regularly from the same place to visually record changes on the property.

Records need to be accurate and auditable. There are numerous models and templates you can link to or be involved with, for example:

<http://www.farmiq.co.nz/>

http://www.fertiliser.org.nz/Site/code_of_practice/default.aspx

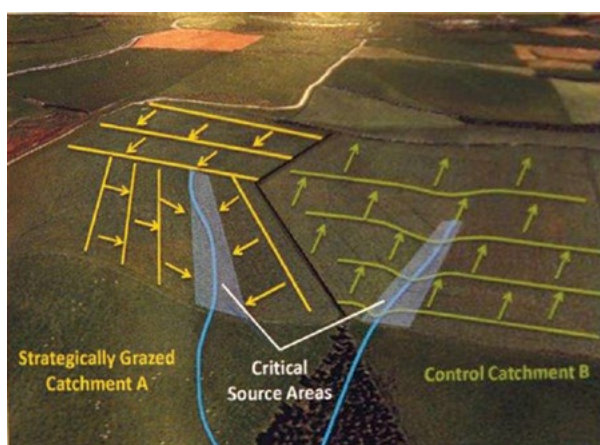
Critical Source Areas

GMP - Manage grazing to minimise soil and nutrient losses from critical source areas

A critical source area (CSA) is a landscape feature like a gully, swale or a depression that accumulates runoff from adjacent flats and slopes and delivers it to surface waterways such as rivers and lakes, artificial waterways and field tiles.

Research has shown that runoff from CSAs with connectivity to waterways during storm events can account for most of the annual phosphorous loss from a farm. Preventing stormwater from sluicing over these hot spots can significantly reduce this loss.

Common CSA include swales, depressions, gullies, wallows, muddy gateways, troughs in water flow-path locations, poorly located silage pits and winter self-feed structures located where stormwater flows through. These can all be CSAs as they have high concentrations of sediment and contaminants when it is wet.



Winter crop paddocks with CSAs can carry high amounts of sediment, nutrients and high-risk bacteria from faecal contamination sources such as *Escherichia coli*. This has a detrimental impact on waterways as well as causing loss of valuable soil and nutrients from paddocks. This is particularly so with heavier stock classes and is accentuated further when soil is bare for long periods.

Strategic grazing during intensive winter grazing, by starting at the top of slopes, back fencing and leaving all the CSAs to last if the paddock is in crop can reduce this loss by up to 70%. If in grass, leave until growth resumes.

Mitigation options:

- Develop buffer zones or grass strips in and around CSAs and next to waterways as they act as filters by slowing overland flow to trap suspended contaminants
- To operate effectively, a buffer zone should be left uncultivated and ungrazed
- Shift stock regularly, especially in wet weather or in drought conditions
- Avoid long stock rotations (long duration in a set rotation pattern)
- Encourage camping in desired areas by planting shade and shelter
- To reduce runoff, sow crops for grazing across slopes if possible rather than up and down hills
- Graze lower-lying areas and areas closest to waterways last
- Construct silt traps or ponds to capture sediment, nutrients and bacteria

Water Protection

Preventing deer access to waterways

GMP - To the extent that is compatible with land form, stock class and intensity, exclude stock from waterways

Key points for consideration:

- Plan and prioritise waterway areas (including wetlands) to fence, based on the vulnerability of the land, significance of the waterway and potential to impact on off-farm water quality
- Exclusion of extensively farmed stock from waterways in hill and high country areas may not always be practical, but a mix of mitigations and practices can be used to minimise sediment and faecal bacteria losses from farms
- Actively manage stock, stock density and stock classes adjacent to waterways to reduce risks to water where fencing is not practical
- Exclude stock from significant waterways, drains and significant wetlands
- Locate and manage deer crossings of waterways so they do not degrade those waterways
- Provide alternative stock-water sources away from waterways where possible
- Provide shade and shelter away from waterways where appropriate
- Place salt blocks and supplementary feed away from riparian margins
- Leave an appropriate buffer depending on slope to filter runoff, even if only temporarily during vulnerable periods, e.g. intensely grazed crop.
- During high-risk periods for erosion, e.g. winter grazing and fawn weaning, actively manage stock to prevent paddock slumping, pugging or erosion
- Check with your council for local rules

Fencing

Deer can permanently damage and pollute waterways. Farmers must take steps to protect water resources on deer farms.

In planning any waterway fencing, focus on intensively grazed lowland areas first, as these will not only be easier to fence but also carry a higher risk of damage due to higher stocking rates.

Planning and implementing stock water reticulation, protective fencing and stock exclusion from waterbodies can benefit animal health and stock production.

Excluding deer from streams, ponds or lakes prevents direct sediment and faecal material contamination, while allowing riparian and water body vegetation to grow, which will help filter any runoff.

Mitigation options:

- Riparian buffers provide vegetation to filter any overland flow, particularly in wet periods. Requirements may vary by region, season and land management activity
- Preparing and implementing riparian plans can help identify priority areas, allocate the necessary budget and identify the plants required. You may need to order some plants a year in advance from your local nursery. The DairyNZ Riparian Planner is a good tool and available for all farmers: <https://www.dairynz.co.nz/environment/waterways/riparian-planner/>
- Many organisations now publish planting guides so check with your local Council or nursery
- Constructed wetlands can provide vegetated areas that will filter out contaminants and can be designed to fit the catchment, rainfall, soil type and contaminant issue. Just developing an open water pond can often result in increased E.coli through attracting more ducks, so make sure you know what your issue is and design it accordingly
- Consider if a gate is needed into the fenced area for retrieving any escaped deer and for maintenance of the area
- Unfenced waterways in extensively stocked areas should be managed to minimise effects
- Install floodgates in vulnerable sections of fencing which may be affected by flood waters. Refer to Infrastructure section



Sediment and pathogen losses to waterways

GMP – Identify risk of overland flow of sediment and faecal bacteria on the property and implement measures to minimise transport of these to water bodies.

Key points for consideration:

- Soil conditions and crop rotation
- Areas that are harvested, grazed or stock damaged (resulting in bare soil) are re-sown as soon as practical to minimise periods of exposed soil
- Rest and re-sow erosion-damaged areas
- Use cover crops (green feed, oats or mustard) to reduce losses and nutrient use; this also increases organic matter
- When developing paddocks, retain native vegetation such as tussock and shrub habitat in gullies, steep and higher country. This will regulate water runoff, help retain water quality, reduce soil movement and provide filter areas before water enters streams. A significant co-benefit is that it also provides cover for newborn stock

Note: Council consent is normally required for abstracting, damming or diverting water, discharging pollutants into, or placing structures on the beds of lakes, rivers and the coast, with the exception of taking water for domestic or stock use.



Erosion of farmland and river bank erosion can result in loss of productive land and soils and have considerable downstream effects. Left unchecked, soil erosion can compromise water quality, increasing sediment loads and causing silt build-up; nutrients from the soil also affect the water's chemical balance.

Sediment in stream beds smothers gravels and insect life, and reduces oxygen levels, resulting in poor ecosystem health and limiting diversity. High sediment loads can persist in a waterway and be stirred up when there is a slight 'fresh', resulting in poor water quality over a long period.

Where possible undertake regular water quality monitoring to identify what conditions waterways are in and identify any losses. Parameters generally monitored include nitrogen, phosphorous, E. coli and turbidity (water clarity).

Macroinvertebrates (water insects) are also an indicator of stream health and don't cost anything to monitor. Guides are available on the NIWA website and a phone app is also available.

Links: How to monitor your stream

www.niwa.co.nz or
www.landcare.org.nz/Regional-Focus/Gore-Office/Pomahaka-Project

www.niwa.co.nz/our-science/freshwater/tools/shmak/manual/6doing

Mitigation options:

- Plant riparian margins to protect the waterway
- Fence the waterway and riparian area where appropriate or required by regulation
- Seek professional advice and develop and use a settling area such as a constructed wetland with vegetation that will filter out sediments to improve water quality
- Plant winter crops such as brassicas well away from streams
 - If this is unavoidable, break fence the feed towards the stream and leave a buffer filtration zone clear of the stream banks. Ideally this should be at least 3m from the waterway margins, but check your local regulations first

Wallowing

Wallowing is a natural behaviour of deer, thought to benefit stock through tick control, hair removal, cooling and social interaction.

Wet areas, especially surface water that can be stirred up into mud, or shallow water pipelines attract wallowing behaviour.

Hot weather also encourages wallowing, but deer may also wallow in cold, wet weather and when there is a change in paddocks at any time of the year.

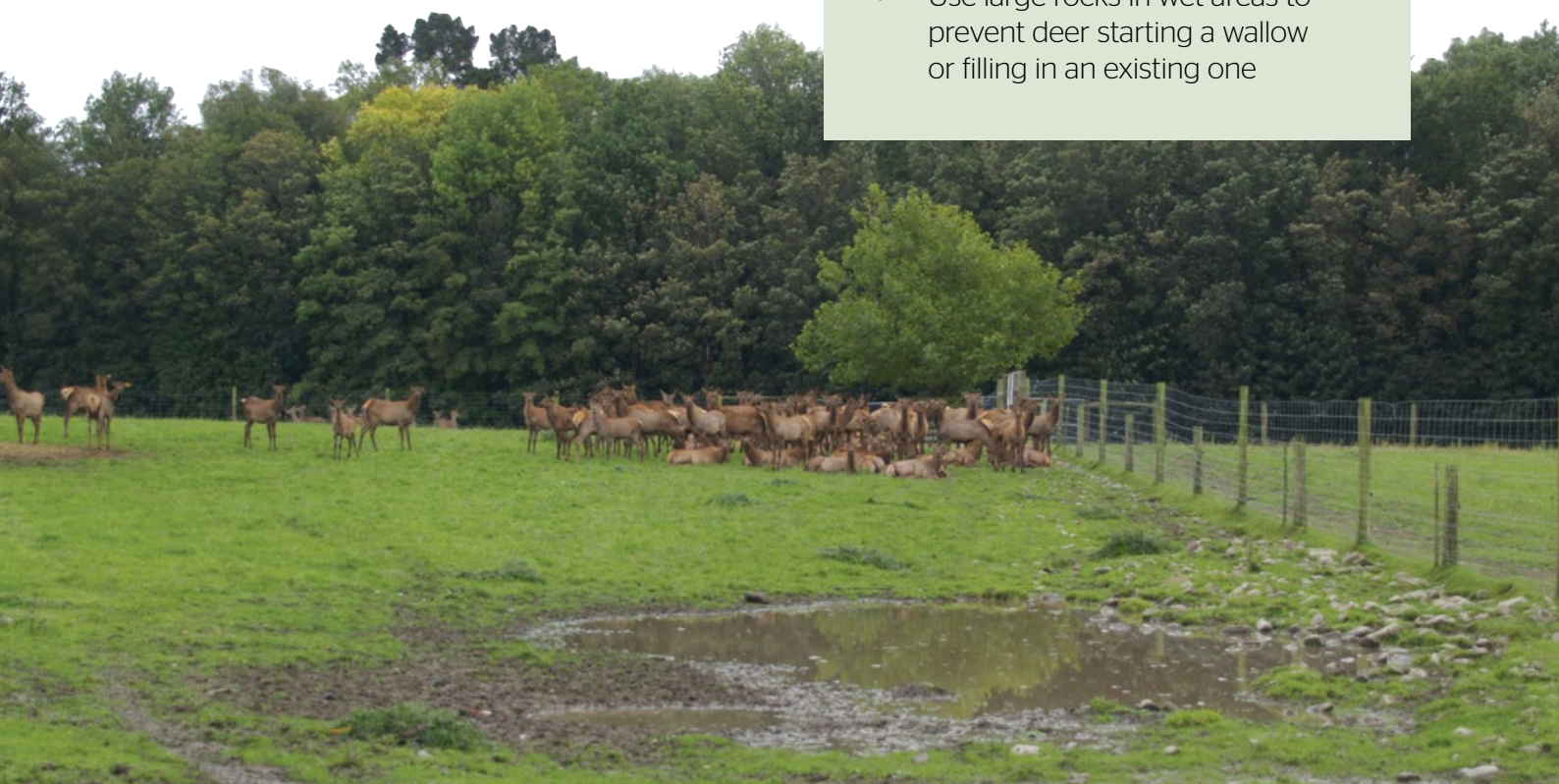
Red deer wallow more than other types.

Farmers often allow a wallow in paddocks, as deer will create another or target troughs if wallows are removed. However this becomes a management problem as a CSA if wallows are connected to waterways and become a potential source of contaminants, transferring muddy soil, faecal bacteria and nutrients from wallows to other parts of the farm.

There may also be an associated deer health risk through creating an environment that harbours infective bacteria deposited in wallows in faeces and urine that are frequently associated with Johne's disease infection and leptospirosis etc. that can be passed between deer.

Mitigation options:

- Fence stock out if wallows are made in a significant natural wetland. Do not tap springs or drain wetlands
- Provide an alternative, scooping out a damp hollow away from watercourses
- Fence wet areas temporarily or permanently
- Keep deer out of paddocks with poor drainage during wet weather
- Design, protect and manage troughs well
- Design and manage run off from wallow sites with the use of sediment traps
- Limit stock time in vulnerable areas
- Provide shade trees to keep stock cool
- Reduce stocking density
- Integrate other stock such as fallow deer, sheep or cattle
- Use large rocks in wet areas to prevent deer starting a wallow or filling in an existing one



Managing wallowing in water troughs

Deer like to play in water so splashes and leaks at troughs and shallow water lines can quickly become major wallow holes.

Mitigation options:

- Allow only a small area for drinking, covering the remaining opening and valve with wooden boards, wire and mesh, rails or concrete posts
- Use a greater number of small troughs
- Locate troughs against or beneath fences that can serve multiple paddocks. However if you are managing stags in hard antler this positioning close to fencing can also risk entanglement, or the inability to access adequate water
- Locate troughs on raised mounds, like a rock/shingle platform 300-400 mm high
- Locate troughs on well-drained sites, improving drainage if necessary
- Locate troughs where deer do not congregate
- Check regularly that there are no valve faults or overflows
- Fix leaks as soon as possible
- Provide shade in the paddock to prevent deer from cooling in trough water
- Provide a wallow elsewhere in the paddock
- Reduce water pressure in pipelines or at a trough
- If stock water is supplied via a dam, install a gravity-fed reticulated system adjacent to the dam rather than providing direct access. This prevents damage to the dam and surrounding area and provides cleaner water
- Use a concrete post border and fill the wallow with gravel

Remedies for repairing wallow sites:

- Fill with gravel, broken concrete, rotten rock, limestone, lime, sand, pumice, or stones plus soil, then overfill with soil
- Re-sow the filled wallow with scattered hay or pasture species that thrive locally
- Drain the area using Novaflow™ drain coil pipe, tiles and scoria as appropriate
- Remove water sources like leaks, unless it is a natural wetland
- Level the site and re-contour where appropriate
- Protect filled wallows with fences/branches
- Fence and plant with wet-tolerant trees or grasses/sedges
- Use good pasture establishment methods, with the appropriate rate of seed, seed type and fertiliser and ensure soil is at optimum fertility levels to maintain growth
- Use hardy species on the downhill side of a wallow
- Identify natural springs and wallows before cultivating paddocks and pipe or drain into retired areas
- Provide a suitable area away from waterways for safe wallowing
- Ensure water troughs are positioned to avoid overflow having direct access to waterways



Wetlands

Wetlands come in many forms. They are critical features of quality water management and on farm biodiversity systems.

A wetland can be the wet margins of streams, rivers, ponds, lakes, lagoons, estuaries, bogs and swamps. They can be permanently or intermittently wet (ephemeral) and often may be as simple as a low-lying, boggy area growing rushes or cutty-grass.

A wetland can also be man-made (constructed).

Wetlands are valuable because they filter nutrients, control sediments, assist with flood control, provide a habitat for native wildlife and plants and may also have cultural or recreational values.

They are particularly valuable for cleaning up diffuse nutrient losses within the farm (see Constructed Wetland Treatment of Tile Drainage at www.niwa.co.nz).

Drainage of natural wetlands is not generally permitted by councils (refer to Biodiversity).

Resource Consents are almost always required for altering wetlands as many wetland types are significant and rare. Contact your local council for advice on managing wetlands and information on possible funding to manage wetland areas.

Your local native plant nursery can provide information on wetland plants suitable for your area.

Mitigation options:

- Find out the values of your wetland before altering the drainage or water levels. This can have a big impact on the plants that grow there and create ideal habitat for weeds. Council staff are happy to provide advice and possibly funding for protection.
- Prevent deer access to wetlands (natural or created) to avoid damage such as pugging and wallowing
- Plant appropriate native wetland species such as flax, toetoe, sedges and cabbage tree (*Cordyline australis*) around the margins of a wetland to improve water quality and habitat
- Consider permanently protecting a significant wetland through a QEII covenant
- Do not take, use, dam or divert water from wetlands unless allowed by resource consent or regional plan regulations
- Do not discharge any contaminants where they may enter a water body, including a wetland



Soil Management

GMP – Manage farming operations to reduce soil erosion and minimise direct and indirect losses of sediment and nutrients to water and maintain or enhance soil structure.

Key points for consideration:

- Measures to prevent sediment and nutrients entering waterways (e.g. sediment traps or interception drains, headlands or diversion bunds, grazing techniques)

- Measures to prevent soil erosion through erosion, overland flow and wind blow (e.g. spacing of planted trees, windbreaks, cover crops)
- Distance from surface waterways and effectiveness of buffer zones
- Slope of land (degree and length) in relation to waterway
- Soil type and texture, quality (e.g. pugging or compaction susceptibility)
- Climatic and weather conditions to determine timing of cultivation
- Cultivation methods (pre-, during and post-cultivation; contour, no or low tillage)
- Previous use of land and future use of land
- Using sub-soiling or soil aerators to remedy compaction of soils



Pugging

Pugged soils are highly compacted and have lost their natural soil structure. This inhibits grass growth and rainwater absorption, leading to rapid surface water run-off. It may be possible to separate areas of free-draining lighter soils from susceptible heavier soils, allowing them to be managed differently (refer to Land use capability for more information on land use options).

Pugging happens after prolonged wet weather at any time of the year but commonly in winter. Management factors that can lead to pugging are underfeeding, overstocking, not shifting deer to new pasture soon enough, shifting deer onto and off crop paddocks, lack of shelter or situations that create stress in animals.

Mitigation options:

- Keep deer off vulnerable areas such as heavy, saturated soils if possible
- Ensure stocking rates fit paddock size, soil type, pasture cover and season. Allow for a sacrifice paddock if necessary
- Avoid repeated shifting between pasture and crop paddocks
- Feed deer well before and during cold, wet weather
- Shift deer to dry, sheltered areas before extreme weather arrives if possible
- Shift deer onto feed pads with good surrounding shelter during the wet
- Back-fence on crop paddocks so deer cannot return and cause further pugging
- Avoid break-feeding on very wet (saturated) soils
- Avoid high deer numbers in holding paddocks with clay-rich soils near yards
- Carry out stock management task in good weather e.g. weaning



Fence pacing

GMP – Identify risk of overland flow of sediment and faecal bacteria on the property and implement measures to minimise transport of these contaminants to waterbodies.

Key points for consideration:

- Plan paddock size, shape, contour and distance from other disturbances in order to prevent erosion from deer pacing
- Identify the best stock class to fit the soil types to minimise the risk of soil erosion
- Maintain pasture length in winter or wet periods to prevent soil being washed off in heavy rain
- Retain in particularly vulnerable areas, tussock cover or native vegetation to regulate water runoff and to reduce risk of soil loss, particularly in gullies or along riparian margins
- Maintain appropriate feeding levels to reduce stress and fence pacing
- Develop screen plantings around known fawning and weaning paddocks to reduce disturbance between mobs

Mitigation options:

- Keep fences off steep areas. Fence around rather than up a hill, choosing a favourable contour rather than the shortest, steepest route
- Double fence critical slopes and tracking areas
- Fence off bare areas and plant trees that can provide shade, shelter, fodder, timber and a barrier between paddocks
- Break up straight fence lines with trees in triangular barriers or barrels with netting
- Ensure gateways are sited correctly for stock flow and width
- Protect problem areas with electric fences. Ensure outriggers don't cause entanglement or shift pacing further out and check frequently, particularly with larger mobs of stags
- Cultivate or fill in the area with soil, clay, gravel, rocks, waste wood pulp, silage waste, branches or small hay bales. Overfill to make it last longer
- Drain the area, using mole drains, Novaflo drainage coil or tiles, ensuring the water table is correctly aligned for water channels

Camp site management

Mobs of deer rest in one area of the paddock close to each other, choosing camping areas for their comfort, flatness, safety, distance from human activities, views of the area and other deer, shelter and warmth in cold weather and shade and breeze in heat.

Deer are most content when they have a hard, rocky or dry area as a campsite.

Deer without suitable camping sites, particularly in small paddocks, may pace instead of resting or camp near the gate. Those without shade in hot weather seek windy knobs or exposed ridges.

Stags do not cause problems for much of the year.

Mitigation options:

- Avoid high stocking densities
- Avoid long stock rotations (long duration in a set rotation pattern)
- Use shade, shelter and varied topography to provide several good camping sites in all weather
- If possible, provide several suitable camping sites in large paddocks to disperse camping
- Avoid planting the highest clear spot, as it will block the mob's ability to relax and observe their surroundings and watch activity
- Locate and protect deciduous trees (not conifers) in the middle of the paddock, for breeze and shade at all times of the day
- Shift fences if necessary to change some camping sites
- Prune individual shade trees high so the shade moves around and away from the tree
- Spread out camping activity by allowing deer access to their previous paddock
- Avoid feeding near gates if possible
- Feed hay on the bare damaged soil
- Spell the paddock or graze cattle
- Keep paddock angles and fences or tree lines at 90 degrees or more, as deer congregate in acutely angled corners of paddocks
- Consider use of temporary electric fencing to protect vulnerable CSA or high-risk areas. It can as a bonus train fawns to electric fences later in their management (eg. crop feeding control) and can be very effective, although that in itself demands more surveillance. Keeping the bottom wire or two wires dead can also allow the fawn to find safe cover while it is very young



Play site management

Deer, especially young stock, play when they are happy and healthy but also when bored, needing exercise, or for social reasons.

They like to play on the most erosion-prone areas where soil is easy to disturb, such as warm sunny slopes, on bare ground, ridges and gullies. They will play near water and when shifted into a new paddock. Many farmers feel that play is a sign that deer are thriving, and aim to control its effects rather than prevent play.

Mitigation options:

- Use thick, high pasture cover in paddocks (at the risk of compromising feed quality)
- Avoid using large mobs and high stocking densities, especially for young stock
- Allow one area of bare ground and an associated wallow area
- Keep young stock off vulnerable areas like steep slopes and banks
- Keep weaners on a fast rotation
- Provide shade in hot weather
- Provide play objects such as drench containers, cleaned oil drums, tree stumps or a felled tree



Managing erosion and bare areas

GMP – Manage periods of exposed soil between crops/pasture to reduce risk of erosion, overland flow and leaching.

Key points for consideration:

- Soil conditions and crop rotation
- Re-sow areas that are harvested, grazed or stock damaged (resulting in bare soils) as soon as practical to minimise periods of exposed soil
- Rest and re-sow erosion-damaged areas
- Use cover crops (green feed, oats, mustard, other biological activators) to reduce nutrient losses; this also increases organic matter
- When developing paddocks, retain native vegetation such as tussock and shrub habitat in gullies, steep and higher country, as this will regulate water runoff, help retain water quality, reduce soil movement and provide filter areas before water enters streams
- Slope has a major influence on the generation of sediment. If slope angle is doubled, you generate three times the sediment. If slope length is doubled, you generate 1 ½ times the sediment

Persistent bare areas in deer paddocks can be caused by stock camping sites, areas where young stock play, feeding sites and following pasture and soil damage such as from rabbits, heavy machinery, overgrazing, and pugging from heavy deer stocking concentrations.

Prevention should always be the aim.

Minor bare areas are not always a problem. However, remedial action is best taken sooner rather than later. If damage persists despite repeated repairs, change stock management around the problem area. Soil needs to be rested and treated to improve air circulation through the soil structure.

Mitigation options for bare areas:

- Use other stock (fallow deer or sheep) in erosion-prone areas
- Use square rather than rectangular paddock subdivision if possible
- Protect treated areas, using material such as branches or electric fences
- Encourage seed establishment by applying fertiliser
- Cultivate, harrow or sub-soil the ground and re-sow by direct drilling pasture mix
- Lay geotextiles over the bare area
- If erosion is extreme, retire the area from all stock and plant with trees

Intensive Grazing

GMP – Select appropriate paddocks for intensive grazing, recognising and mitigating possible nutrient and sediment loss from critical source areas as part of the selection process.

Key points for consideration:

- Where possible, select paddocks for winter grazing that
 - are not vulnerable to pugging and compaction
 - do not have significant artificial drainage such as mole and tile drains, waterways, temporary streams or natural drainage channels (running in times of high rain)
- Choose wintering paddocks away from waterways if possible

GMP – Manage grazing to minimise soil and nutrient losses from critical source areas.

Key points for consideration:

- To reduce runoff, sow crops for grazing across slopes if possible rather than up and down hills
- Graze lower-lying areas and areas closest to waterways last, retaining an extra buffer if needed when wet
- Where possible shift deer to dry, sheltered areas before extreme wet weather arrives



Paddock Selection

- When choosing paddocks to plant winter feed crops, look for areas at lower risk of pugging and compaction where possible, with no significant drains or waterways
- To capture phosphorous and sediment runoff when intensive winter grazing, leave a vegetative strip not grazed from the edge of drain or waterway
- Graze from the top to bottom of the paddock during the wettest period on sloping terrain
- As soon as possible, replant the grazing area in a crop/pasture that will use up the residual N in the soil
- Use shade, shelter, cover and varied topography to provide several good camping sites in all weather
- Avoid excessively high stocking densities
- Avoid long set stock periods or long slow rotations
- Encourage camping in desired areas by planting shade and shelter



Deer Management

GMP – Identify and manage stress periods for each stock class, ensuring feed covers and quality are appropriate for each class.

Key points for consideration:

- Shift deer to new paddocks before feed runs out and fence pacing occurs
- Keep deer in familiar groups with same age and size, or groupings of related hinds
- Feed plenty of fresh, clean, varied, quality food with ample energy and nutrients
- Provide trees, shrubs or scrub between paddocks for screening, hiding and shelter and improving biodiversity
- Introduce new deer to mobs carefully and in groups if possible
- Monitor animals regularly on self-feed silage pits to make sure all animals retain the required body condition score

Deer management can have a major influence on behaviour and stress levels, and their resulting impact on soils. Correct feeding, keeping stock in age and breed classes and recognising stressful times for deer can go a long way to reducing their impact and improving their overall health and welfare..

Mitigation options:

- Shift stock regularly, especially in wet weather or in drought conditions
- Shift large mobs regularly, especially if paddocks are small and increase frequency of shift in bad weather
- Keep young stock off erosion-prone areas and shift weaners early
- Feed supplements to quieten younger animals and new arrivals
- Avoid using steep paddocks during weaning, calving, the rut and wet weather
- Provide varied topography where possible for shelter, vantage points, camping and hiding
- Provide play areas, such as a mound of soil
- On small farms consider providing toys (e.g., plastic fishing floats, clean drench drums, etc.) for young stock
- Minimise disturbances of vulnerable younger stock by humans, unfamiliar sources and farm activities



Rutting stag management

Rutting stags confined by fences on deer farms are thought to pace because the natural desire to roam and access hinds, to defend, or to fight or flee from other stags is inhibited. Red deer, particularly Eastern red deer, are considered more prone to pacing than other breeds. Older and dominant stags and ex-sires seem to pace the most. The situation is often exacerbated where paddocks are small and different mating mobs are in visual or audible contact.

Mitigation options:

- Avoid placing single-sire mating groups in adjacent paddocks
- Keep cycling hinds well away from other stag groups
- Spread out stag food supplements well
- Provide multiple sources of drinking water
- Post-rut return breeding stags to large paddocks to allow them to regroup and re-establish their hierarchy
- Add spiker males with yearling breeding hinds in January to socialise and settle and enhance their mating success
- Keep stags paddocks as far as possible from areas of disturbance such as yards or public access (e.g., roadways, walking tracks, etc.)
- Have an appropriate stocking rate for your country and system



Newly weaned fawn management

Pacing by newly weaned fawns typically reflects a desire to rejoin their mothers for social reasons. Some have a lactation nutrition drive if weaned early (often done in response to summer drought). Weaners may often be placed in unfamiliar surroundings, grouped with other deer, or have been transported to a new property. This unsettles them.

Under the industry's Code of Welfare, Deer (2007), newly weaned deer (both hinds and fawns) must not be transported within 10 days of weaning unless the process and transport can be completed within 6 hours. In that case, additional care needs to be taken to minimise stress and the risk of fence-pacing or other environmental damage at this critical time.

Mitigation options:

- Provide high-quality, familiar feed and ample water of good quality in a familiar place
- Wean into a familiar secure paddock, ideally one previously grazed by the hind/fawn group for 3-4 days immediately before weaning
- Feed supplements, especially grain, for two weeks before and during weaning, to allow the hind fawn mob to become familiar with the feeding routine and adapt to the feed type. Continuing that routine after weaning is a critical management tool
- Retain fawns in their pre-weaning mobs if possible
- Add some settled older deer such as dry hinds to the mob as a stable nucleus and as leaders for further stock movement
- On large farms separate fawns from hinds as far away as possible, out of sight, smell and hearing. On smaller farms use adjacent secure paddocks
- Wean into large paddocks with low stocking densities
- Avoid disturbing newly weaned fawns; keep away from roads and unfamiliar people
- Use mob sizes of 50-200 fawns
- Consider soft weaning by progressively removing groups of hinds from the mob
- Consider delaying weaning until after the rut, or later if possible to reduce separation stress
- Add 20-40 fawns at a time if creating large mobs
- Avoid using the same paddocks for weaning each year if damage is apparent
- Tag (NAIT and any ID ear tags) and carry out animal health activities 2-3 weeks before weaning to avoid adding additional stress at this vulnerable time
- Ensure fawns kept in yards after weaning have shade, shelter, good feed and water and monitor at least daily
- Monitor weather forecasts and delay weaning if bad, cold and/or wet weather is predicted within 5 days of planned weaning
- If weaners are immediately transported on the day of separation, dry sheltered paddocks near the handling facilities are preferred

Hind management

Hinds pace just before fawning, probably because they need to find their own secluded quiet place to give birth. They seek a safe place that has cover for the fawn and is as far as possible from disturbance from other hinds during the critical hind-fawn bonding process.

At fawning, excessive pacing and associated fence line soil damage almost certainly indicates an excessively high stocking rate and overcrowding issue for the hinds seeking a quiet birthing area.

Overcrowding also affects both fawn survival (loss through disturbance and mismothering) and hind herd behaviour.

Hinds will also pace if they have lost a fawn through the fence. Discomfort may also cause pacing.

Pacing of newly weaned hinds generally reflects a desire to be with her fawn and may also be due to discomfort from a full udder. Some farmers think hinds that pace the most are the best mothers. Minimising pacing damage from newly weaned hinds follows the same practice as recommended for fawns (as above).

Mitigation options:

- Select fawning areas that have minimal disturbance where possible
- Aim to establish ideal stocking rates for example up to 6 hinds/ha in typically down land or rolling country
- Avoid very large mobs where possible, or mobs with a great range of fawning dates
- Provide supplementary feed to help settle hinds pre-fawning
- Provide plenty of low scattered cover in the paddocks (e.g. long grass, weeds, scrub, cut branches) and topographical variety such as hollows or gullies. Consider not harvesting/cutting an area in the middle of the paddock to provide cover
- Feed the hinds well
- Use familiar paddocks, ideally the same ones each year
- If you have fewer options to create ideal fawning environments, consider leaving gates open between paddocks if the pacing worsens. However, that can result in fawn problems with separation stress and fence entanglement when they are very young and may exacerbate mismothering.



Nutrient Management

Timing of fertiliser inputs

GMP – Manage the amount and timing of fertiliser inputs, taking account of all sources of nutrients, to match plant requirements and minimise risk of losses.

Manage nutrients from all sources including the soil, supplementary feed, previous grazing and crops and other organic sources (e.g. manure, plant residue).

Key points for consideration:

- Regular soil testing to identify nutrient needs, particularly for paddocks that are going into crop
- Use expert guidelines, for example using crop calculators, expert agronomic advice or codes of practice
- Apply nitrogen and phosphorus fertiliser strategically to meet agronomic requirements and to avoid adverse environmental impacts (e.g. strategic use around CSAs)
- Use nutrient budgets as a tool to manage nutrient loss

- Modify fertiliser application by using side dressings and split applications as these may help reduce the risk of leaching and ensure greater utilisation of nutrients by plants
- Time nitrogen applications to match plant needs and maintain phosphorus at optimal soil test levels

The two major environmental challenges from fertiliser use are leaching to ground water and losses to open water.

Detailed guidelines are provided in the Fertiliser Association of New Zealand's Code of Practice for Nutrient Management to optimise fertiliser use and avoid or reduce adverse effects on the environment. The Code has best practice recommendations on fertiliser handling, use and application and detailed information on nutrient management planning. The Code also provides a template for producing a Nutrient Management Plan.

http://www.fertiliser.org.nz/Site/code_of_practice/default.aspx

Regional councils have a responsibility under the Resource Management Act (1991) to control land use activities to avoid, mitigate or remedy adverse effects on the environment. This includes controlling discharges to land, water and air and has implications for fertiliser handling and use. Check with your council for any further specific regulatory requirements.

Monitoring phosphorus levels

GMP – Monitor soil phosphorus levels and maintain them at or below the agronomic optimum for the farm system.

Key points for consideration:

- Conduct regular, on-going soil testing (Olsen P or an equivalent, recognised soil test) at the block scale to determine the level of phosphorus fertiliser needed and to monitor trends, patterns and the impacts of nutrient management decisions
- Leave an unfertilised strip as a buffer zone beside creeks, drains and storm water flood zones. Allow more distance as slopes become steeper as this can help to slow water flow and improve filtering of any run-off

New Zealand soils are generally naturally low in phosphate (P), sulphur and some trace elements. Applying fertiliser regularly supplements the soil's natural nutrient level and compensates for farm nutrients removed or lost from soil during animal production. Without this, pasture production would be between half and a quarter of what it is today. However, fertiliser must be applied and managed carefully to avoid contaminating waterways.

Soil testing, preparing a nutrient budget (using OVERSEER®) and a nutrient management plan are all essential tools that should be included in the FEP. Discuss soil testing and nutrient management plans with a qualified consultant who is often your local fertiliser company representative.

Consultants should be proficient at using OVERSEER and qualified with the Advanced Sustainable Nutrient Management course run by Massey University www.massey.ac.nz.

A full copy of the Code of Practice is available from the The Fertiliser Association of New Zealand.

Contact your local council for information and relevant regulations on nutrient run off and management, and fertiliser application limits.

Mitigation options to avoid P loss contaminating open water:

- Maintain Olsen P at or below the agronomic optimal levels
- Do not apply P fertiliser if Olsen P soil test readings already exceed optimum levels for plant growth
- Leave an unfertilised strip as a buffer zone, generally beside creeks, drains and storm water flood zones. Adjust this buffer width for slope
- Develop permanent riparian strips, including dense ground-hugging species, to filter overland flow
- Increase the buffer distance between intensively-used and fertilised pasture and open waterways
- Avoid overgrazing of pasture before fertiliser application. Fertiliser uptake is better and there is less loss to the environment if the pasture is at least 25 mm (preferably 50 mm) long at the time of application (1600-1800 kg DM/ha)
- Maintain soil structure and avoid soil compaction as this leads to increased soil and P loss
- Identify CSAs for P loss and put mitigation measures in place

Mitigation options to minimise N loss to waterways:

- Undertake regular soil tests and assess applications based on a nutrient budget via OVERSEER
- Develop a nutrient management plan as an integral part of your FEP
- Consider selecting less soluble and mobile forms of fertiliser
- Check nitrogen fertiliser recommendations for your area. Generally annual nitrogen applications should not exceed 200 kg N/ha/yr for intensive pastoral systems (using split applications of 50 kg N/ha/yr at a time), but some councils enforce a lower annual limit.

Fertiliser storage and spreading

GMP – Store and load fertiliser to minimise risk of spillage, leaching and loss into waterbodies.

Key points for consideration:

- Following the Fertiliser Industry Code of Practice for Fertiliser Handling, Storage and Use
- Locating storage sites away from waterways

GMP – Ensure equipment for spreading fertilisers is well maintained and calibrated.

Key points for consideration:

- Only using accredited contractors for fertiliser spreading. The current industry standard is Spreadmark™
- Ensure your spreading equipment is calibrated according to its design specifications and specific for the product being spread
- Obtain records of fertiliser applications that are kept (or sought from contractors), including product, application rate, date, and location



Mitigation options:

Phosphorous

- Keep fertiliser storage sites a good distance (e.g. 50 m) from any waterway (but check your local regulations)
- Use Spreadmark-accredited fertiliser spreading wherever possible and ideally use GPS and GIS technology for precise application and for a digital record of fertiliser placement control
- Apply P in drier months
- Avoid applications before heavy rain or on saturated ground when tile drains are already running. This will help avoid direct surface runoff of P-enriched water or particulate loss
- Consider the wind direction and strength when applying fertiliser near water and be prepared to postpone application in adverse conditions

Nitrogen

- Apply N fertiliser at a rate that the plant can use it, as nitrate leaching is minimised when there is rapid nitrogen uptake by actively growing pasture
- Time N applications to match vigorous phases of plant growth. N application will achieve the most efficient results in spring/summer
- Split N applications into smaller amounts if possible (e.g. 30–45 kg N/ha at a time for grazed pasture) and apply more frequently over the growing season
- Avoid application if heavy rain seems likely and especially if the ground is already saturated. Direct leaching of soil nitrogen is greatest in winter when drainage is high and plant growth is low
- Avoid application of N in winter months (May, June and July in colder regions)
- Avoid application when soil temperature at 10 cm depth is less than 7 degrees at 9 am

Feed

Storage and transport

GMP – Store, transport and distribute feed to minimise wastage, leachate and soil damage.

Key points for consideration:

- Design feed storage facilities to minimise wastage and soil damage, i.e. sealed or compacted surface
- Locate feeding areas away from waterways
- Distribute feed to minimise soil damage (from farm equipment and animals) and potential surface run-off to waterways, i.e. avoid Critical Source Areas

Silage leachate

Grass silage leachate is about 200 times stronger than raw sewage and 40 times stronger than dairy wastewater. It has high levels of nutrients and ammonia, is strongly acidic and will cause severe de-oxygenation, creating major adverse effects on water quality and stream organisms.

Take great care to ensure silage leachate does not reach waterways. Check your council's regulations for silage pit location.

Mitigation options to avoid silage leachate:

- Make sure silage is made at the optimum moisture content to reduce possible leaching, recommended at 30% dry matter or more
- Avoid groundwater seepage into the pit
- Consider lining pit with concrete, including drainage channels to a sump and bunding
- Locate silage pits well away from any watercourse and make sure leachate does not run close to any waterway or find a pathway to a stream
- Locate silage pit some distance away from any well used for water supplies (check with your regional council about the regulations)
- Locate pit well away from farm boundaries
- Site silage stacks so that overland flow of water from heavy rain cannot enter the stack



Infrastructure

GMP – Locate and manage farm tracks, gateways, water troughs, self-feeding areas, stock camps, wallows and other sources of run-off to minimise risks to water quality.

Key points for consideration:

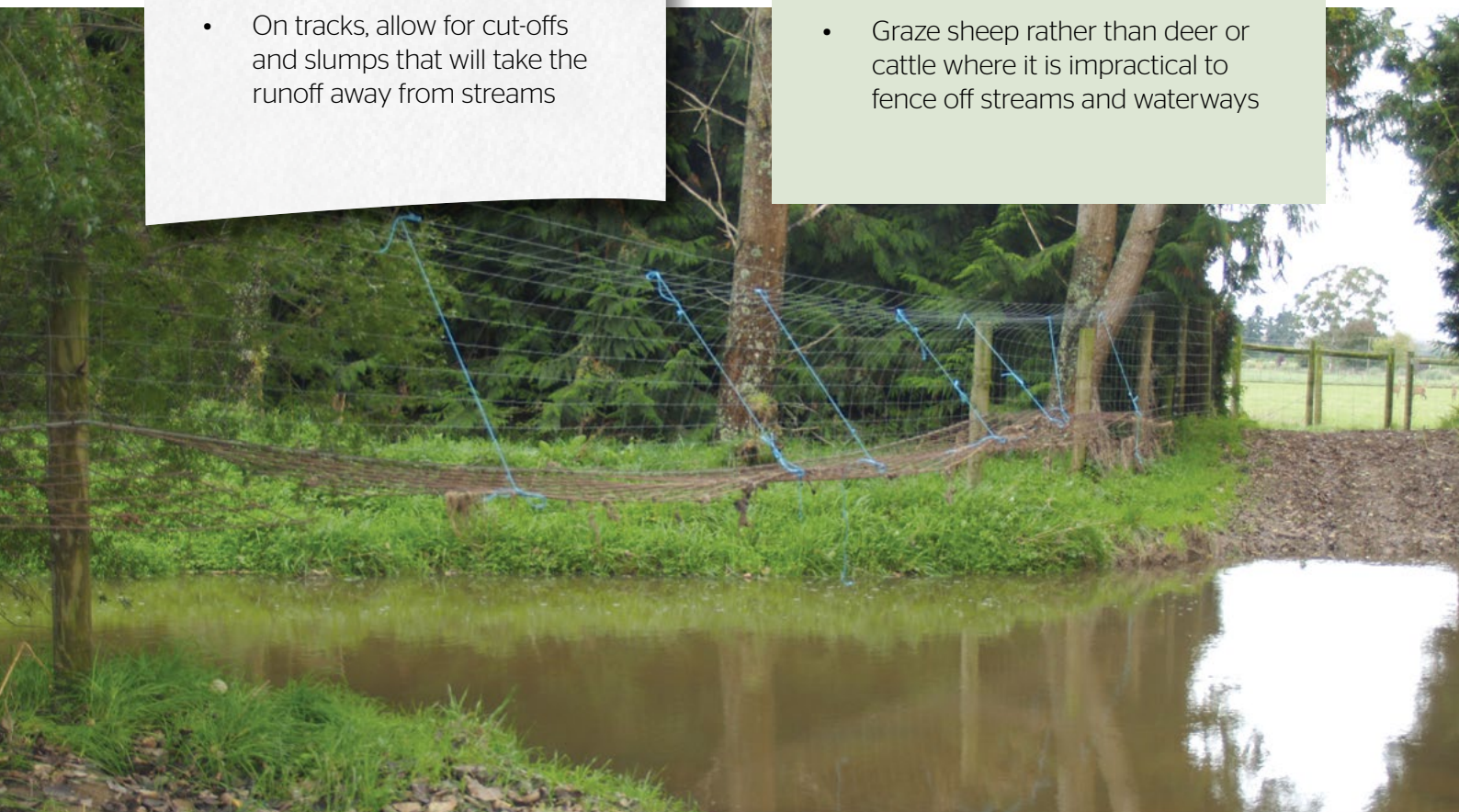
- Locate and design laneways so that run-off is filtered by a vegetated strip
- Design and manage laneways to minimise water ponding, excessive effluent build-up and erosion
- In areas exposed to wind erosion, establish shelter belts with trees that will filter the wind and provide added shade and shelter
- On tracks, allow for cut-offs and slumps that will take the runoff away from streams

Flood gates

Fencing across streams is undesirable but not always avoidable, so installing swinging flood gates is recommended. Wide streams may need several separate swinging gates

Mitigation options:

- Construct floodgates from corrugated iron, timber, reinforcing mesh or netting
- Clear debris from mesh and netting regularly
- Run a separate wire strain across the entrance and exits to the flood channel as a sacrifice section, or construct the fence with a break link. Flood water may remove this part but will not rip out the rest of the fence
- Graze sheep rather than deer or cattle where it is impractical to fence off streams and waterways



Culverts and crossings

Farm bridges and culverts must be constructed to allow stream life to pass freely. Structures over streams are regulated under the Resource Management Act and bridges and culverts may require council resource consent.

The Department of Conservation may also have requirements.

The NZ Forest Road Engineering Manual 2012 has valuable information on water, erosion and sediment control and waterway crossings with information on culvert sizes required for different catchment areas.

<https://www.nzfoa.org.nz/resources/file-libraries-resources/transport-and-roading/484-nz-forest-road-engineering-manual-2012/file>

This was superseded in 2017 with the National Environmental Standard (NES) for Plantation Forestry that sets a new and considerably higher performance standard for roading.

It also prohibits the fording of streams during the fish spawning and migration season. There are 31 at-risk species of native fish including mudfish, as well as trout and salmon, which need to be considered. The new standard limits fording to 20 axle crossings per day.

Refer to the stream crossing regulations in the NES as Gazetted. <http://www.legislation.govt.nz/regulation/public/2017/0174/latest/whole.html>

Mitigation options:

- Use appropriate-sized pipe to cater for increasingly extreme events
- Build sturdy culvert sides using logs, cement or timber to withstand erosion
- Where possible, position culverts where deer will move easily across them
- Install sediment traps on the approaches to bridges and culverts to reduce the amount of sediment reaching the stream
- Divert water runoff from tracks through grass filtered areas before they enter waterways



Irrigation and Water Use

GMP - Manage the amount and timing of irrigation inputs to meet plant demands and minimise risk of leaching and runoff.

Key points for consideration:

- Application depth and uniformity checks are undertaken before and during the season
 - System adjustments have been made when application depth and uniformity testing show need for adjustments
 - System is operated within the annual allocation
 - System is reconfigured to improve efficiencies
 - Areas that have high irrigation run-off risk are clearly identified and systems are in place to mitigate and manage the risk
- GPS or other technology is used to aid placement
 - Irrigation applications to non-target areas are minimised
 - The system is closed down if run-off and/or ponding occurs and action taken to correct problem
 - Water is strategically applied according to crop requirements
 - There is recognition of differences in soil properties and adjustment of the management of the system accordingly
 - Timers are used to control the amount of water applied



Operating irrigation system

GMP – Design, calibrate and operate irrigation systems to minimise the amount of water needed to meet production objectives.

Key points for consideration:

- Any new development, upgrade or redevelopment is consistent with irrigation industry codes of practice
- The irrigation system is evaluated annually to demonstrate optimal performance using irrigation industry guidance
- Actual irrigation water take is measured with a water meter. Soil moisture levels are tracked throughout the season to justify irrigation events, e.g. using soil moisture balance calculations, soil moisture probes or tapes

- Full pre-season maintenance checks undertaken on all irrigators
- Ongoing system maintenance is undertaken through the season and these actions recorded
- Irrigation system is maintained and calibrated to operate at its optimum level
- Breakages and system failures are fixed and corrective actions taken and recorded
- Annual audit of system completed to identify efficiency improvements and actions taken to address identified problems
- If appropriate employ variable rate irrigation together with soil Electromagnetic (EM) mapping
- Operate SMART Irrigation (Sustainably Managed, Accountable, Responsible and Trusted irrigation)

<http://smartirrigation.co.nz/smart-irrigation>

www.irrigationnz.co.nz

Waste Management, Farm Effluent and Wastewater Management

Inorganic waste

GMP – Minimise inorganic waste on farm by using plastic containers or material that can be reused or recycled.

Key points for consideration:

- Store chemicals in a separate safe lockable storage facility and maintain a record of chemicals on hand
- Check with your local regional council for regulations regarding safe chemical storage and disposal, leachate from landfill and offal pits and options for recycling or landfill use
- If accumulating inorganic material is unavoidable and recycling is not an option, dispose of it in an environmentally safe way using your local official regional landfill or a suitable farm landfill

Mitigation options:

- Separate silage wrap from bale net, shake and roll, put into the recycling bags or bins provided. Store under cover to await removal
- Empty agrichemical and animal health plastic containers and triple rinse to be free from residue both inside and out. Take to the designated collection depot
- Follow GROWSAFE™ guidelines when using chemicals and use correct safety gear
- Attend a local GROWSAFE introductory course
- Store chemicals in a locked shed or cupboard solely for chemicals. Identify storage area with an appropriate Hazchem sign
- Store and mix chemicals well away from waterways
- Mix in an area where spills can be contained, such as with raised concrete edges
- Keep a bag of inert absorbent material such as kitty litter handy in case of spills
- Spray in calm conditions, to eliminate negative effects beyond your boundary
- Triple rinse empty agrichemical containers into the mix being used
- Dispose of empty agrichemical containers as per label instructions and council recommendations
- Avoid spraying near waterways unless the chemical is approved for this purpose
- Use chemicals approved for purpose
- Read labels. If uncertain, seek advice
- Ensure your agricultural contractors are registered chemical applicators through GROWSAFE

Plastic waste

Options for disposing of plastic waste, including silage wrap, are burying, recycling or storing. Plastics should not be burned. Your regional council will have advice on recycling and landfill options in your area.

Commercial recovery

One waste disposal option available to farmers is recycling. There are several programmes and commercial waste removal companies in New Zealand with recycling and recovery services.

The AgRecovery rural recycling programme is specific to the primary sector and offers services that recycle or recover containers, silage wrap, crop protection net, unwanted chemicals and other farm waste, throughout New Zealand (www.agrecovery.co.nz). Other recycling services may also be available in your area. Contact your local council for further information.

Agrichemical use and disposal

Minimise chemical use through establishing a clear demonstrated need before use, and evaluate non-chemical alternatives. Accidental spills and leaks from agrichemicals can contaminate, so mix and store carefully to minimise risk. Left-over chemicals must be stored or disposed of in a way that does not contaminate soil or water.

All agrichemical users should follow best practice GROWSAFE (www.growsafe.co.nz) practices required for safe, responsible and effective use of agrichemicals, based on the Industry Standard, NZS8409 – Management of Agrichemicals.



Banned chemicals

The risk of banned chemicals contaminating farm produce is a threat to our markets. Consumers become exposed to organo-chlorines from eating food from farms where these chemicals were once used as insecticides.

Banned persistent organo-chlorines include DDT, Mirex, HCB, Endrin, Dieldrin and Toxaphene. Other chemicals no longer allowed to be used include Endosulfan, Azinphos-methyl and Trichlorfon (except for veterinary use).

Many other chemicals are reassessed each year, so availability of other products may be affected in the future. Disposal of old chemicals is a specialist job. Discuss with local authority hazardous goods staff or contact a commercial company specialising in hazardous goods disposal, such as AgRecovery (www.agrecovery.co.nz).



Farm landfill

Avoid contamination of ground and surface water from leachate coming from landfills. Council consent will be required if there is any risk of landfill leachate. Local councils may also have specific distance regulations on landfill location.

Mitigation options:

- Site landfill away from property boundaries.
- Choose a site with less porous soils, such as clay soil types
- Choose a site well clear of water courses and flood zones, or where ground water could enter
- Avoid disposing of unwanted chemicals or hazardous material such as pesticides, velvetting needles or equipment
- Keep farm landfills separate from offal pits

Effluent system and storage

GMP - Ensure the effluent system meets an industry-specific Code of Practice or equivalent standard.

Have sufficient, suitable storage available to enable farm effluent and wastewater to be stored when soil conditions are unsuitable for application.

Key points for consideration:

- Enclosure systems should be located and managed to minimise the environmental impact of effluent
- Paddock enclosure systems should not result in significant or irreparable soil loss or erosion
- Store effluent for later dispersal to land where appropriate
- Ensure effluent and run-off water do not enter waterways
- Prevent solid waste from entering waterways

Effluent equipment and application

GMP - Ensure equipment for spreading effluent and other organic manures is well maintained and calibrated

Apply effluent to pasture and crops at depths, rates and times to match plant requirements and minimise risk to water bodies.

Key points for consideration:

- Ensure spreading equipment is calibrated according to its design specifications specific for the product that is being spread
- Check that the equipment can apply effluent efficiently
- Ensure the area is compliant with discharge consents
- Apply effluent to pasture and crop at depths, rates and times to match plant requirements and minimise risk to waterbodies

Ref: A farmer's guide to managing farm dairy effluent - DairyNZ. <https://www.dairynz.co.nz/media/2832537/farmers-guide-to-managing-fde.pdf>

Deer faecal management

Dung and urine loss from farm animals is a source of nutrient supply that can affect water quality, either directly if animals have access to waterways or via surface run off from pasture during heavy rain and by seeping into ground water, which in turn can enter waterways as springs.

Unlike the large volumes of urine and dung produced by cattle, deer generate lower and more dispersed volumes with less P and N. Deer droppings are generally deposited close to where they camp, on higher ground away from waterways.

However observed deer behaviour near water is considerably different from other species in habit and effect. While natural deer behaviour may mean less faecal material is deposited directly into water, even a small amount will have negative effects on the natural water system.


Natural wallowing behaviour can also result in large sediment loads carrying nutrients, particularly phosphorus, into waterways. Good management systems are therefore crucial.

Mitigation options:

- Avoid deer access to waterways wherever practical
- Establish a filter of thick grass on the riparian strip to retain deer faeces before they enter waterways. This will expose them to the sun's rays, the UV light killing bacteria associated with dung
- Maintain grass cover on the riparian area by occasional grazing in dry periods to promote short dense tiller growth. Graze riparian areas with sheep if possible, as they are less likely to enter the waterway
- Consider planting shrubs and trees on the riparian strip to discourage access



Dead stock disposal and offal pits



GMP - Dispose of dead stock properly as quickly as possible in an appropriate safe and secure manner.

Mitigation options:

- Never dump dead stock in waterways
- Dig shallow graves that are clear of waterways
- Dig offal pits where there will be no groundwater seepage into or out of the pit
- Fence off offal pits from stock and use a cover or lid if possible
- Consider using sawdust to compost the disposed carcase
- Check your local regional council regulations for rules relating to offal pit construction and use in your area as there may be a minimum distance required from waterways.

Biosecurity

GMP – Minimise the risk of introducing and/or spreading pest plants and animals by implementing good biosecurity farm management practices.

Key points for consideration:

- Limit the number of entry and exit points to your property; this will allow you to better monitor entry sites
- Gates to restricted areas should be locked and signposted
- Display biosecurity signs with clear instructions and contact details at all vehicle access points to inform visitors, whether contractors or guests, of your biosecurity status and what you require of them
- Ensure that all staff and visitors, whether contractors or guests, check that their vehicles, machinery, equipment, boots and clothing are clean and free from soil, mud, insects and seed before entering the property
- Provide footbaths and scrubbing brushes to remove soil and mud from dirty boots for people entering or exiting your property
- Source only certified seed or propagation material

- Quarantine new or returning stock in a designated holding paddock before letting them onto the rest of your property (ideally minimum 2 weeks)
- Ensure all stock entering the property are quarantine drenched
- Ensure that any feed you purchase is free from pest plants and their seeds, or insects. Paddocks in which you have fed stock using purchased feed should be checked regularly for pest plants



Mitigation options:

- Ensure all staff are familiar with how to identify key pest plants and animals in your area and they know the best time of year to look for them
- Before purchasing stock or grazing someone else's stock on your property, ask where the stock have come from and whether they could be carrying pests or diseases, and the necessary hygiene or treatments and quarantine requirements have been adhered to
- If considering grazing your stock off your property think about where they are going and whether they could be carrying seeds, insects or diseases to or from that property. If in any doubt, contact your regional authority
- Purchase feed or feed ingredients from a seller that can verify its safe origin.
- Do not feed ruminant protein (including cattle, sheep, deer, and goat) to ruminant animals unless it's a dairy product. It is not permitted to feed ruminant protein such as blood and bone meal to ruminants. (Note: This is a declaration requirement on your mandatory ASD form associated with any stock movement from your property)
- Work with the youngest and most susceptible animals first and any sick animals last
- Use separate tools and equipment for manure handling and feed or bedding

- Develop a written biosecurity plan for your farm in consultation with your veterinarian or advice from your regional authority
- Ensure that farm dogs are not carrying seed and that horses' hooves and fetlocks are free of soil, mud and seed before letting them on the property
- Regularly monitor and control vermin, wild or feral animals, pests and weed populations to prevent impact on stock and production systems
- Maintain all fencing to prevent access of wild or feral animals

Wash down areas:

- If necessary, use high pressure water to wash down dirty vehicles, machinery and equipment and provide brushes to sweep out vehicle interiors
- Clean vehicles from the top down and dismantle machinery as far as possible to gain access to internal spaces
- An air compressor may be useful for cleaning engine components and shearing handpieces
- Ideally the wash area should be a hard base suitable for hosing and should have a sump to collect any wastewater
- If runoff cannot be avoided, direct it away from pens, yards, paddocks, crops and waterways
- Regularly check surrounds of the wash area for pest plants

What should you do if you find something unusual on your property?

If you find anything unusual on your property or suspect that you have purchased contaminated seed, propagation material, stock or feed, report it to your regional authority or local veterinarian immediately. Take photos of it 'in situ' and record where it is so it can be found again more easily for checking.

Contact the MPI exotic pest and disease hotline (0800 80 99 66) if you suspect an exotic disease.

These are important links to NAIT requirements for deer and to the Animal Health Plan for deer farmers. Also check out Deer Facts which has reference to deer diseases relating to the environment.

https://deernz.org/sites/dinz/files/Deer%20Health%20Review%20Revised%20v4v_O.pdf

<https://deernz.org/sites/dinz/files/Deer-and-NAIT.pdf>

Impacts of introduced pests and weeds

- Reduction in on-farm productivity
- Restrictions on how you can manage farm production or stock movements
- Reduction in the quality and value of animal products
- Lower market value of breeding animals
- The cost of control – often it costs more money and time to control pests and disease than to prevent it
- Negative effects on animal welfare
- Disease in humans

Reference: Drystock Biosecurity Guidelines, Seven Intervention Points for on-Farm biosecurity, prepared by B+LNZ and DINZ June 2013. https://deernz.org/sites/dinz/files/Drystock%20biosecurity%20guidelines%20FINAL_O.pdf

'Pest plants and farm biosecurity', produced by Chilean Needle Grass Awareness Programme.

Department of Conservation: Common Weeds

<http://www.doc.govt.nz/nature/pests-and-threats/common-weeds/>

Biodiversity

GMP – Protect areas of biodiversity and significant natural areas.

Fence significant native areas to keep out stock and undertake pest and weed control.

This will provide special areas for your property and provide habitat for a wide range of birds and insects including many threatened species.

Key points for consideration:

- Use your Farm Environment Plan to help plan protection and record progress
- Contact your council to see if any areas of biodiversity are considered significant natural areas as they may be eligible for funding
- Note existing bush areas and natural water features and their condition and extent
- Obtain information on biodiversity values for prioritising protection for bush, streams and wetlands
- Plan riparian fencing as a first step to maintaining and enhancing waterways
- Fence bush areas to exclude deer and protect the native bush ecosystems
- Extend and recreate local biodiversity ecosystems

- If you don't know about the biodiversity values on your property contact your local council or DoC office
- Seek advice from environmental agencies

Maintaining and enhancing biodiversity is a national issue. The New Zealand Biodiversity Strategy, 2000 (www.biodiversity.govt.nz) has identified that safeguarding the biodiversity of New Zealand's indigenous heritage will ensure native plants and animals and unique ecosystems continue to survive and flourish. All landowners have a significant responsibility and role to assist in this protection strategy and plan accordingly.

Councils have information on managing biodiversity. Several have contestable funds specifically for biodiversity projects. Councils are also responsible for the protection of significant natural areas.

The Department of Conservation protects indigenous flora and fauna by administering large areas of publicly owned parks and reserves. It and the Ministry for the Environment (www.mfe.govt.nz) can advise on biodiversity priorities and provide funding assistance for managing biodiversity on private land.

Managing biodiversity on farm

Many farmers are already actively conserving biodiversity on their land and have fenced or protected remnant bush areas or wetlands. Managing deer farms with areas of biodiversity, particularly if they are significant natural areas, has implications for farmers. Developing a Farm Environment Plan will help identify risk features, and set priorities for protection in line with the national biodiversity objectives. Permanently excluding stock is essential.

Indigenous vegetation protection

All remnant unfenced native bush areas on intensive deer farms will eventually die out if deer are not excluded as there is limited or no seedling regeneration. When deer graze native areas, they eat out the plants they prefer, changing the balance of the plants present. Deer can also damage trees by browsing, stripping bark and rubbing. Many native trees are readily eaten by deer. These include: lancewood (*Pseudopanax* spp.), large-leaved Coprosma species, five finger (*Schefflera digitata*), broadleaf (*Griselinia littoralis*), marbleleaf (*Carpodetus serratus*), mahoe (*Melicytus ramiflorus*), kamahi (*Weinmannia racemosa*), miro (*Prumnopitys ferruginea*) and *Asplenium bulbiferum* (spleenwort). Deer can also eat out grassland plants such as large-leaved herbs like buttercups (*Ranunculus* spp.) and wild carrots (*Anistome* spp.) and some grasses such as snow grass (*Chionochloa flavescens*) and narrow-leaved tussock (*C. pallens*).

Wetland protection

There are many wetland types, from seeps and bogs to raised peat bogs and flax wetlands. Councils have lists of significant wetlands that have special protection and often have funding to assist landowners manage these areas. It is important to identify the values of wetland areas before you start any restoration, protection or nearby development and consult with your local council.

Protecting existing wetlands or constructing new wetlands is an effective way to treat water before it leaves the farm, as well as creating significant aquatic habitat for native species.

Significant areas of wetland have been lost through drainage, development and grazing with most of the remaining wetlands having legal protection under council rules.



Pest control

An ongoing pest control and monitoring programme is an essential part of farming sustainably. Protection of bush areas can actually improve habitat for pests, which are then a considerable risk for deer farms. Possums and ferrets in native bush areas can act as vectors for harbouring and spreading bovine Tb, as can feral deer and pigs. Rats, stoats and cats are a major threat to the biodiversity of indigenous bush as they kill native birds and eat their eggs. Not only that, pests can destroy farm shelter plantings.

Tb outbreaks and vector numbers are linked, so reducing pest numbers will be needed in endemic and fringe areas.

A control programme should accurately identify both the problem and the control solutions, be they poisoning, trapping or shooting, and include a long-term cost/benefit with in-built safeguards on control success and cost variations. TbFree NZ controls the National Pest Management Plan and specific Tb control programmes and has regional operational plans that may affect your area. See www.tbfree.org.nz for detailed information. Pest poisoning is governed by the Hazardous Substances and New Organisms Act, 1996 (HSNO) and administered by councils which can offer advice on control options. Farmers with areas of significant native bush with permanent fencing may be eligible for financial assistance.

Predator Free 2050

Predator Free NZ has set an ambitious goal to rid New Zealand of the most damaging introduced predators that threaten our nation's natural taonga, our economy and primary sector.

Ridding New Zealand of possums, rats and stoats by 2050 is a New Zealand-wide goal. It will require new techniques and a coordinated team effort across communities, iwi, and the public and private sectors. For advice and funding information check www.doc.govt.nz/predator-free-2050

Conservation areas

Some areas of the farm may have significant natural features such as riparian areas, wetlands, indigenous bush and scrub areas, significant landscape features and historic or archaeological sites.

The Resource Management Act (RMA) stipulates the protection of recognised Significant Natural Areas (SNA) on private and productive land. Regional councils have responsibility under the RMA to identify and assist in preserving these areas. Most have funds available to help with their protection and restoration, whether they are historic sites, native bush blocks, wetlands or stream margins and revegetation projects.

Significant areas can be protected by covenant to safeguard special features forever – refer to the Queen Elizabeth II National Trust (www.openspace.org.nz) for more detailed information and assistance.

Several other organisations can help with conservation projects on private land, including the Department of Conservation, NZ Landcare Trust, Nature Heritage Fund, Royal Forest and Bird Protection Society, Fish and Game Council, NZ Forest Restoration Trust and Ducks Unlimited.



Shade and Shelter

GMP – Provide shade and shelter for livestock.

Trees on farms provide shade, shelter, timber, stock food, help to control erosion, add appeal to the property, can be a legitimate economic use for land not suitable for grazing livestock and are valuable for maintaining biodiversity.

Key points for consideration:

- Seek good advice on what grows well in your area
 - When choosing the species to plant, also consider the value of flowering trees to benefit bees and nectar feeding birds
 - Get advice from your regional council or local nursery on what grows well in your area and select the right tree species to fit your purpose
- Look around your neighbourhood to see what grows well in your area
 - Effective shelter can be provided by planting a double row, one of a low dense species and one of larger shrubs or deciduous trees such as flax and poplar
 - All plantings can help provide cover for newborn fawns if a gap is provided at the bottom of fences to allow them through to shelter
 - Effective shade trees can be provided within paddocks as specimens or in small woodlots, or can be planted in corners and as shade belts
 - Willows and some Eucalypt species can be cut down to a low stump that sprouts new branches to be used for firewood (coppicing)
 - To keep stock out, fence new areas for trees before planting
 - Young trees survive best if kept clear of weeds for at least a year after planting
 - Protect trees from weeds and pests, particularly rabbits, hares, possums and livestock, especially during their establishment phase



Many deer farmers believe that deer are more content and pace less when they have shade, shelter, cover and screening along fence lines. Animal productivity is also likely to increase when abundant trees and shrubs are present, the shade and shelter helping livestock to limit energy use to regulate their temperature.

Contact your local council for information on vegetation species, weed and pest control, and regulations on growing trees. The New Zealand Farm Forestry Association has information on suitable species and management (<http://www.nzffa.org.nz/farm-forestry-model/resource-centre/>)

Fodder

Edible trees can be fed as cut branches, browsed through netting or electric fences, or eaten as leaf litter in autumn. Willows and poplars have a moderate nutrition value (9–13 MJ/kgDM) compared with pasture (9–10 MJ/kgDM).

Woodlots

Woodlots provide a profitable alternative land use option in high erosion risk areas that are too difficult to graze. They are also a form of long-term investment, often a retirement fund. A large variety of trees are available, but selection should be based on growing conditions and final objectives. Consider efficiency of the scale of planting – small scattered plantings may not be as economic as larger blocks of trees with good road access.

When designing the woodlot also consider road access for harvesting. Check with the New Zealand Farm Forestry Association for information on suitable woodlot species and management information.



Tree planting

Take time to plan the planting of new trees, considering the aims and the suitable parts of the farm (refer to Chapter 9, Land use capabilities). Plant the seedlings correctly and employ experienced contractors if you are not doing the planting yourself.

Planting technique:

- Cultivate the ground with a spade or by using a machine to loosen soil
- Spot spray area for weeds to maintain a weed-free area of about 1m²
- Remove soil to create a hole large enough for the tree roots
- Bury a short portion of the seedling's lower stem along with the planted roots to prevent excessive moisture loss
- Replace the soil, lifting the seedling gradually to ensure roots are straightened
- Firm the soil around the roots by treading while applying upwards pressure on the seedling



Weed and pest control

Animal pests, including rabbits, hares and possums, can destroy new tree planting. Use suitable predator-proof fencing or tree guards and pest control methods specific to the pests in your region if necessary.

Good weed control will ensure that seedlings will survive even during drought in the first year. Control pasture grasses as well as weeds around the seedling, as they suck up the available soil moisture. Check if herbicides can be used both pre and post tree planting, and ensure herbicides are suitable for the particular species being grown as some are sensitive to post-planting sprays.



Antler rubbing

Antler rubbing is a natural behaviour of stags that aids stripping of the drying velvet skin and prepares the stag for the rut by sharpening the antlers and strengthening the neck muscles.

Mitigation options:

- Feed the deer well
- Provide stags with alternatives such as scrub, large branches, stumps, logs, posts or drums, or trees such as pine
- Protect trees with fences, corrugated iron, netting, branches or concrete posts
- Consider protecting trees with electric fences, but take care as fatalities can occur with electric outriggers. Some farmers move the hot wire in, by placing the insulators directly onto the posts
- Avoid large mob sizes and high stocking densities
- Use paddocks with fence line screening and varied topography
- Install rubbing posts mid-paddock, or old posts driven in just off the fence
- Locate stags away from unprotected trees during the velvet growing period

Carbon

GMP – Maximise farm resources to ensure output efficiency is optimised.

Farmers should consider the net mitigation benefit of all farm practices, looking at efficiency in production and how to retain carbon through vegetation capture to offset against carbon loss through resource use. Increasing soil carbon benefits soil quality and function as well as meeting requirements for reducing emissions.

Key points for consideration:

- Retain forest areas, both in production forest and native bush where possible and look at carbon credits for these areas
- Retain wetlands as they are major carbon sinks
- Replant areas in exotic trees in a production forest system
- Limit the amount of time paddocks have bare soil as this is when the most carbon is lost
- Avoid overgrazing
- Ensure consistent grass covers
- Increase/maintain soil carbon levels at optimum levels for your soil type
- Optimise cultivation frequencies to avoid unnecessary soil disturbance

Production on all farms is part of a complex biological system. Understanding the role of carbon is important for farmers to allow them to play their part in managing the carbon emissions that are part of greenhouse gas production.

Emissions reductions can be made by:

- Adopting good management practices to the whole farming system
- Continually making on-farm efficiency gains: input versus output
- Maximising forage crop quality
- Optimising fertiliser usage
- Optimising Nitrogen usage per hectare and/or per animal
- Optimising animal performance i.e. reproductive rates, animal health, growth rates and maximising lifetime productivity
- More effective management of animal waste
- Using other mitigation technology as it is developed

Carbon cycling

Carbon cycling is the continuous process of exchanging carbon between organisms and the environment. The living plant absorbs carbon dioxide from the atmosphere, processes it into the food chain, and returns it to the atmosphere via respiration and decay of animals, plants and organisms. Plants and trees absorb carbon dioxide and are a common way of offsetting carbon emissions when in plantations and forestry blocks. Soil also contains carbon produced by organic matter like roots and plant litter, but the carbon dioxide it releases via soil bacteria remains relatively stable. However, there will be subtle changes in soil carbon levels if there are changes in fertiliser policy, stocking rate and productivity on farm and in cropping management practices.

Measuring carbon

All New Zealand businesses, including farmers, are being encouraged to identify their business's carbon footprint and create an emissions inventory. A good range of carbon calculators are available from a variety of New Zealand organisations and businesses for farmers to calculate the scope of their emissions.

Check with MfE for further information on carbon calculators.

Carbon trading

The New Zealand Emissions Trading Scheme (ETS) is a way for New Zealand to meet its international obligations for climate change. It puts a price on greenhouse gases to provide an incentive to reduce emissions and encourage tree planting, and trades on these emissions using New Zealand Units (NZU). Landowners can earn carbon credits from eligible forests in return for storing carbon. Farmers with scrubland, regenerating bush, or exotic forest should be banking credits and liabilities, and on-selling via carbon traders to generate cashflow, or offset emissions from energy use.

www.climatechange.govt.nz/emissions-trading-scheme

Reducing emission intensity

- New Zealand agriculture produces 49% of all New Zealand greenhouse gases. In contrast the OECD average is 12%.
- New Zealand produces 0.2% of total global greenhouse gases and about 0.6% of the total global agricultural emissions.
- Dairy, beef and sheep make up 97% of all agricultural greenhouse gas emissions in New Zealand.
- New Zealand farmers need to be responsible global citizens helping to reduce greenhouse emissions and the risk of climate change.
- On average, greenhouse gas emissions per unit of meat or milk have dropped about one percent per year for the past 20 years.
- Reducing greenhouse gas emissions can have other on-farm benefits, i.e. improving productivity and water quality.
- The New Zealand livestock sector will have to make some contribution to reducing greenhouse gases as part of New Zealand's obligations to the Paris Agreement targets.

www.mfe.govt.nz/climate-change/why-climate-change-matters/global-response/paris-agreement

Sources: NZAGRC: Fact Sheet; What We are Doing

Regulations

No two farms are alike; each farm has unique landscapes, natural resources, farming practices and goals. How each farmer manages their land and environment is also individual, but developing a system or plan with achievable timeframes is a practical and helpful way of identifying those needs and tracking progress.

An Environment Management System (EMS) recommended for deer farmers, which is also being used on New Zealand sheep and beef properties is the Land and Environment Plan (LEP) or FEP, developed by Beef+Lamb New Zealand <http://www.beeflambnz.co.nz> 0800 BEEFLAMB (0800-233-352).

New Zealand has statutory requirements that regulate how farmers manage their farming environment. The Resource Management Act 1991 (RMA) is New Zealand's fundamental legislation that sets out how we should manage the impact of land use activities on our environment. Management of farm chemicals is also governed by the HSNO Act 1996. Codes of Animal Welfare set standards for animal care.

A full copy of these Acts is available from the New Zealand legislation site www.legislation.govt.nz

Resource Management Act 1991 (RMA)

The purpose of the Act is to promote the sustainable management of natural and physical resources. The Act has implications for any activity that uses or impacts in some way on natural resources. A key intention is that “every person has a duty to avoid, remedy or mitigate any adverse effect on the environment arising from an activity carried on by, or on behalf of, that person”.

New Zealand's local councils are responsible for environmental sustainability and resource management, with the statutory function of managing land use activities under the Resource Management Act 1991. Responsibilities include responding to climate change, natural hazards, pest management, waste management, soil conservation, air quality and water management.

Contact your council for specific information on land management issues for your area (refer Chapter 12, Links for your local council).

National Policy Statement for Freshwater

What the Freshwater NPS is about

The National Policy Statement for Freshwater Management 2014 (Freshwater NPS) sets out the objectives and policies for freshwater management under the Resource Management Act 1991. It came into effect on 1 August 2014. The amended Freshwater NPS superseded the original 2014 version on 7 September 2017.

National policy statements are issued by central government to provide direction to local government about how they carry out their responsibilities under the Resource Management Act 1991 when it comes to matters of national significance.

The matter of national significance to which the Freshwater NPS applies is the management of fresh water through a framework that considers and recognises Te Mana o Te Wai as an integral part of freshwater management.

What it requires

The Freshwater NPS directs regional councils, in consultation with their communities, to set objectives for the state of freshwater bodies in their regions and to set limits on resource use to meet these objectives.

Key requirements of the Freshwater NPS include:

- Consider and recognise Te Mana o Te Wai in freshwater management
- Safeguard fresh water's life-supporting capacity, ecosystem processes and indigenous species
- Safeguard the health of people who come into contact with the water
- Maintain or improve the overall quality of fresh water within a freshwater management unit
- Improve water quality so that it is suitable for primary contact more often
- Protect the significant values of wetlands and outstanding freshwater bodies
- Follow a specific process (the national objectives framework) for identifying the values that tāngata whenua and communities have for water, and using a specified set of water quality measures (called attributes) to set objectives
- Set limits on resource use (e.g., how much water can be taken or how much of a contaminant can be discharged) to meet limits over time and ensure they continue to be met
- Determine the appropriate set of methods to meet the objectives and limits
- Take an integrated approach to managing land use, fresh water and coastal water
- Involve iwi and hapū in decision-making and management of fresh water

The above list is not exhaustive.

For more detailed information about the requirements of the Freshwater NPS see Guidance on implementing the Freshwater NPS or read the Freshwater NPS itself.

<http://www.mfe.govt.nz/publications/fresh-water/national-policy-statement-freshwater-management-2014>

How it is being implemented

The Freshwater NPS must be fully implemented no later than 31 December 2025 (or 31 December 2030 in certain circumstances).

If regional councils cannot implement the Freshwater NPS by the end of 2015 they must have prepared a progressive implementation programme of time-limited stages to meet the 2025 date, and make this publicly available. They must report annually on the status of their progressive implementation programme.

The Ministry for the Environment and the Ministry for Primary Industries are providing guidance to support councils, iwi, and other people involved in implementing the Freshwater NPS in their local communities.

The guidance includes a range of:

- Online resources that explain what needs to be done at different stages of the freshwater planning process
- Publications that provide more detail for the people involved, to help them through the various stages

2017 changes to the National Policy Statement for Freshwater Management (Coalition Government 2017)

The changes adopted in September 2017 are aimed at ensuring freshwater quality improves over time. This includes:

1. Supporting the Coalition Government's national swimming targets

The Government has set a new target to make 90 percent of New Zealand's rivers and lakes swimmable by 2040 and requires regional councils to improve water quality and to report on contributions to achieving regional targets every five years.

2. Monitoring requirements

In addition to the existing monitoring requirements, regional councils are now required to monitor progress towards freshwater objectives and values using macroinvertebrates, indigenous flora and fauna and mātauranga Māori. They are required to establish methods for responding to monitoring and to make monitoring information publicly available.

3. Managing nutrients in rivers

There are new requirements for regional councils to follow when managing the level of nutrients – such as nitrogen and phosphorus – that can go into waterways.

Regional councils are now required to specify the nutrient levels they are aiming for in their regional plans.

4. Te Mana o Te Wai

The concept of Te Mana o Te Wai recognises fresh water as a natural resource that is integral to the social, cultural, economic and environmental well-being of communities. The Freshwater NPS has been updated to clarify the meaning of Te Mana o Te Wai in freshwater management.

5. Economic well-being

Changes make it clear that regional councils should consider the economic well-being of communities at all stages of decision-making under the Freshwater NPS, as well as the environmental, social and cultural well-being. It makes it explicit that this consideration is within the context of setting environmental limits.

6. Maintaining or improving freshwater quality

New provisions clarify requirements for regional councils about maintaining or improving overall water quality, to make the requirements clearer.

7. Infrastructure exceptions to national bottom lines

There are minor changes to the Freshwater NPS to clarify how it applies in cases where national bottom lines for water quality are unable to be met because of significant infrastructure (e.g., hydro dams).

8. Coastal lakes and lagoons

There are minor changes to clarify the requirements for coastal lakes and lagoons which are sometimes seawater and sometimes fresh water.

Link <http://www.mfe.govt.nz/fresh-water/national-policy-statement/about-nps>

Hazardous Substances and New Organisms Act (HSNO) 2015

This Act controls the import, manufacture, use, handling and storage of hazardous substances in New Zealand. The Environmental Protection Authority (EPA) (www.epa.govt.nz) administers the rules and qualifications needed to transport, use and store hazardous substances safely and issues handling certification for chemical use.

Animal Welfare (Deer) Code of Welfare 2007

The Ministry for Primary Industries (www.mpi.govt.nz) administers this code, intended to encourage all those responsible for deer welfare to equal or exceed the minimum standards of husbandry, care and handling (<https://www.mpi.govt.nz/protection-and-response/animal-welfare/codes-of-welfare/>)

Industry codes

The New Zealand pastoral industry also has Industry Standards, Quality Assurance Processes and Codes of Practice to provide guidelines and best practice on specific farm topics.

These include the Code of Practice for Nutrient Management, (http://www.fertiliser.org.nz/Site/code_of_practice/default.aspx) produced by the NZ Fertiliser Manufacturers' Research Association and the Codes of Practice on fertiliser quality and fertiliser spreading (Fertmark and Spreadmark) administered by Fertiliser Quality Council. (<http://fertqual.co.nz/understanding-the-marks/spreadmark/>) and (<http://fertqual.co.nz/understanding-the-marks/fertmark/>)

The deer industry is an active participant of the Sustainable Agriculture Management Systems Network, an information hub on sustainable management systems (SMS) in the agriculture and horticulture sectors in New Zealand. More information on the Deer Industry's QA System is available through Deer Industry New Zealand. (www.deernz.org)

Links

AgRecovery

Provides a rural recycling programme.

Ph: 0800 247 326

PO Box 1216, Hastings 4156

www.agrecovery.co.nz

AgResearch

Undertakes research into pastoral farming, including deer.

Ph: 07 834 6600

Private Bag 3123, Hamilton 3240

www.agresearch.co.nz

Auckland Council

Provides technical assistance and advice on sustainable land management. May have funding assistance for environmental works.

Ph: 09 301 0101

Private Bag 92300, Auckland 1142

www.aucklandcouncil.govt.nz

Bay of Plenty Regional Council

Provides technical assistance and advice on sustainable land management. May have funding assistance for environmental works.

Ph: 0800 884 880

PO Box 364, Whakatane 3158

www.boprc.govt.nz

Beef+Lamb New Zealand

Provides Land and Environment Plan information and template.

Ph: 04 473 9150

PO Box 121, Wellington 6140

www.beeflambnz.com

Climate Change NZ

Offers information about climate change impacts and implications.

Ph: 04 439 7400

PO Box 10362, Wellington 6143

www.climatechange.govt.nz

Department of Conservation

Administers the Natural Heritage Fund and Biofunds.

Responsible for managing natural and historic heritage.

Ph: 04 471 0726

PO Box 10420, Wellington

www.doc.govt.nz

Deer Industry Environmental Awards

NZDFA and DINZ award to recognise deer farmers who are farming productively and in harmony with their local environment.

Ph: 04 473 4500

PO Box 10702, Wellington 6143

www.deernz.org

Deer Industry New Zealand

Responsible for promoting and assisting the development of the New Zealand deer industry. Maintains Deer QA Systems.

Ph: 04 473 4500

PO Box 10702, Wellington 6143

www.deernz.org

Ducks Unlimited

Assists with conservation projects.

www.ducks.org

Environment Canterbury Regional Council (ECan)

Provides technical assistance and advice on sustainable land management. May have funding assistance for environmental works.

Ph: 0800 324 636

PO Box 345, Christchurch 8140

<https://www.ecan.govt.nz/>

Environmental Protection Authority (EPA)

Administers the rules and qualifications needed to transport, use and store hazardous substances safely, and issues handling certification for chemical use.

Ph: 04 916 2426

PO Box 131, Wellington 6140

www.epa.govt.nz

Environment Southland

Provides technical assistance and advice on sustainable land management. May have funding assistance for environmental works.

Ph: 0800 76 88 45

Private Bag 90116, Invercargill 9840

www.es.govt.nz

Federated Farmers of New Zealand

Farmer lobby group.

Ph: 04 473 7269

PO Box 715, Wellington 6140

www.fedfarm.org.nz

The Fertiliser Association of New Zealand

Maintains a Code of Practice For Nutrient Management. Promotes and encourages responsible and scientifically-based nutrient management.

Ph: 04 473 6552, PO Box 11519,

Manners Street Central, Wellington 6142

<http://www.fertiliser.org.nz/>

Fish and Game Council

Assists with conservation projects.

Ph: 04 499 4767

PO Box 13-141, Wellington 6440

www.fishandgame.org.nz

Gisborne District Council

Provides technical assistance and advice on sustainable land management. May have funding assistance for environmental works.

Ph: 0800 653 800

PO Box 747, Gisborne 4010

www.gdc.govt.nz

Greater Wellington Regional Council

Provides technical assistance and advice on sustainable land management. May have funding assistance for environmental works.

Ph: 04 384 5708

PO Box 11646, Wellington 6142

www.gw.govt.nz

GROWSAFE

Provides Agrichemical use training to meet the Industry Standard, NZS8409 – Management of Agrichemicals.

Ph: 0508 476 972

www.growsafe.co.nz

Hawke's Bay Regional Council

Provides technical assistance and advice on sustainable land management. May have funding assistance for environmental works.

Ph: 06 835 9200

Private Bag 6006, Napier 4142

www.hbrc.govt.nz

Horizons Regional Council

Provides technical assistance and advice on sustainable land management. May have funding assistance for environmental works.

Ph: 06 952 2800

Private Bag 11025, Palmerston North 4442

www.horizons.govt.nz

Irrigation NZ

Irrigation NZ is a membership-funded national industry body that promotes excellence in irrigation.

<https://www.irrigationnz.co.nz/>

Land and Water Forum

A collaborative process looking at managing water in New Zealand into the future.

Ph: 04 471 0341

PO Box 10822, Wellington 6143

www.landandwater.org.nz

Landcare Research

Provides the Land Use Capability (LUC) survey handbook.

Ph: 03 321 9999

PO Box 40, Lincoln 7640

www.landcareresearch.co.nz

Lincoln University
Offers specialist land-based tertiary training.
Ph: 03 325 2811
Ellesmere Junction Road, Lincoln 7647
www.lincoln.ac.nz

Marlborough District Council
Provides technical assistance and advice on sustainable land management. May have funding assistance for environmental works.
Ph: 03 520 7400
PO Box 443, Blenheim 7240
www.marlborough.govt.nz

Massey University
Offers an Advanced Sustainable Nutrient Management Course.
Ph: 06 350 5701
Private Bag 11 222, Palmerston North 4442
www.massey.ac.nz

MetService
Latest New Zealand weather forecasts, including tides, snow reports, radar maps and NZ weather maps.
Ph 04 470 0700
www.metservice.com

Ministry for the Environment
Responsible for the Resource Management Act
Ph: 0800 499 700
PO Box 10362, Wellington 6143
www.mfe.govt.nz
www.legislation.govt.nz/act/public/1991/0069/latest/DLM230265.html

Ministry for Primary Industries
Administers Codes of Animal Welfare. Offers information on carbon. Manages the Sustainable Farming Fund.
Ph: 0800-008-333
PO Box 2526, Wellington 6140
www.mpi.govt.nz

Native Forest Restoration Trust
Assists with conservation projects.
PO Box 80-007, Green Bay, Auckland
www.nznfrt.org.nz

Nelson City Council
Provides technical assistance and advice on sustainable land management. May have funding assistance for environmental works.
Ph: 03 546 0200
PO Box 645, Nelson 7040
www.nelsoncitycouncil.co.nz

New Zealand Biodiversity
Is responsible for the New Zealand Biodiversity Strategy, 2000.
www.biodiversity.govt.nz

New Zealand Deer Farmers' Association
Assists in maximising sustainable benefits for all deer farmers and links agricultural industry and the public.
Ph: 04 473 4500
PO Box 10702, Wellington 6143
www.deernz.org

New Zealand Farm Environment Trust (NZFET)
Promotes sustainable farm management and administers environment awards, including the Ballance Farm Environment Award (BFEA).
PO BOX 36071, Christchurch 8146
www.nzfeatrust.org.nz

New Zealand Farm Forestry Association
Provides guidelines on tree choice and establishment for New Zealand farms.
Ph: 04 472 0432
PO Box 1122, Wellington
www.nzffa.org.nz

NZ Landcare Trust

Provides information on landcare management practice.

Ph: 0800 526 322

PO Box 4305, Hamilton, 3247

www.landcare.org.nz

NIWA

*Produced report on How clean are our rivers?
Provides detail on constructed wetlands.*

Ph: 09 375 2050

Private Bag 99940

Newmarket, Auckland 1149

www.niwa.co.nz

Northland Regional Council

Provides technical assistance and advice on sustainable land management. May have funding assistance for environmental works.

Ph: 0800 002 004

Private Bag 9021, Whangarei 0148

www.nrc.govt.nz

Otago Regional Council

Provides technical assistance and advice on sustainable land management. May have funding assistance for environmental works.

Ph: 03 474 0827

Private Bag 1954, Dunedin 9054

www.orc.govt.nz

OVERSEER®

Provides OVERSEER – a nutrient management tool to estimate nutrient cycles within a farm system, to optimise production and environmental outcomes.

www.overseer.org.nz

QEI National Trust

Administers open space covenants to protect significant natural and cultural features.

Ph: 04 472 6626

PO Box 3341, Wellington 6140

www.openspace.org.nz

Royal Forest and Bird Protection Society

Assists with conservation projects.

Ph: 04 385 7374

PO Box 27420, Wellington 6141

www.forestandbird.org.nz

Taranaki Regional Council

Provides technical assistance and advice on sustainable land management. May have funding assistance for environmental works.

Ph: 06 765 7127

Private Bag 713, Stratford 4352

www.trc.govt.nz

Tasman District Council

Provides technical assistance and advice on sustainable land management. May have funding assistance for environmental works.

Ph: 03 543 8400

Private Bag 4, Richmond, Nelson 7050

www.tasman.govt.nz

TB free New Zealand (formerly the Animal Health Board)

Runs the National Tb Control Programme.

Ph: 0800 482 463

PO Box 3412, Wellington 6140

www.Tbfree.org.nz

Waikato Regional Council

Provides technical assistance and advice on sustainable land management. May have funding assistance for environmental works.

Ph: 0800 800 401

Private Bag 3038, Hamilton 3240

www.waikatoregion.govt.nz

West Coast Regional Council

Provides technical assistance and advice on sustainable land management. May have funding assistance for environmental works.

Ph: 0508 800 118

P.O. Box 66, Greymouth, 7805

www.wcrc.govt.nz

Glossary

BFEA	Balance Farm Environment Award, administered by the NZ Farm Environment Trust.	EMS	Environmental Management System – an internationally recognised system for implementing sustainable management on farm.
Biodiversity	The number and variety of organisms found within a specified geographic region.	Ephemeral	An ephemeral waterway flows only on occasion, not permanently.
Biophysical	The biophysical environment is the biotic and abiotic surrounding of an organism or population, and consequently includes the factors that have an influence in their survival, development and evolution	Erosion	Physical removal of soil through surface detachment of individual particles by wind, rain and frost, gullyng by surface and subsurface runoff, deep-seated mass movement by earthflows and slumps, shallow mass movements by slips as channelised mass movement by debris flow.
Constructed wetland	A man-made wetland area made to improve on-farm water quality.	EurepGAP	Fresh produce food standard set by Europe food retailers to give their customers more assurance on food safety, through Good Agricultural Practices (GAP). Fertigation – the injection of fertilisers, soil amendments and other water-soluble products into an irrigation system
CSA	Critical source areas for phosphorus loss. Run-off during storm events results in significant phosphorus loss from CSAs.	GPS	Global Positioning System.
% DM	Percentage of dry matter in stock feed.	GROWsafe	A training programme to promote the safe use of agrichemicals.
Deer Industry Environmental Awards	Biennial Award to recognise deer farmers who are farming productively and in harmony with their local environment, funded by the NZ Deer Farmers' Association and Deer Industry New Zealand.	Geotextiles	Fabric used for the construction of porous sediment traps.
Demeter	A worldwide certification system used to verify production by biodynamic methods.		

HACCP	Hazards Analysis Critical Control Point. A system for assuring food safety, documenting organisational structures and procedures and design and construction requirements for food handling premises.
HSNO	Hazardous Substances and New Organisms Act, 2004.
ISO	International Standards Organisation.
ISO 14001	International Environment Standard.
Land and Water Forum	A government-supported stakeholder group to consider new ways to manage water issues in New Zealand.
LEP	Land and Environment Plan – a planning process for implementing sustainable farm management, sometimes called a Farm Environment Plan (FEP).
LUC	Land Use Capability – the types of uses land is capable of sustaining.
New Zealand Biodiversity Strategy	Refers to the New Zealand Biodiversity Strategy to halt the decline of indigenous flora and fauna at risk.
Riparian	Land surrounding waterways often retired from grazing.
RMA	Resource Management Act.

SAMSN	Sustainable Agriculture Management Systems Network. Information hub on sustainable management systems in agriculture.
SMP	Sustainable Management Plans – a form of planning for implementing sustainable farm management.
SNA	Significant Natural Area – protection of ‘significant indigenous vegetation and significant habitats of indigenous fauna’ as a matter of national importance.
Mitigating	To make good damage that has occurred.
NMP	Nutrient Management Plan – documents and monitors management of nutrient inputs and outputs to optimise productivity and minimise adverse effects on the environment.
Waterways	The course that naturally occurring water takes in defined channels, creeks or streams or across pasture on its way through the catchment. Waterways may be ephemeral (occasional) during rain events or wet periods of the year, or perennial/permanent.
Wetland	Permanent or intermittent wet areas, shallow water and land water margins supporting a natural ecosystem of plants and animals adapted to wet conditions.

