

Farm dairy effluent workshop



Farm Dairy Effluent

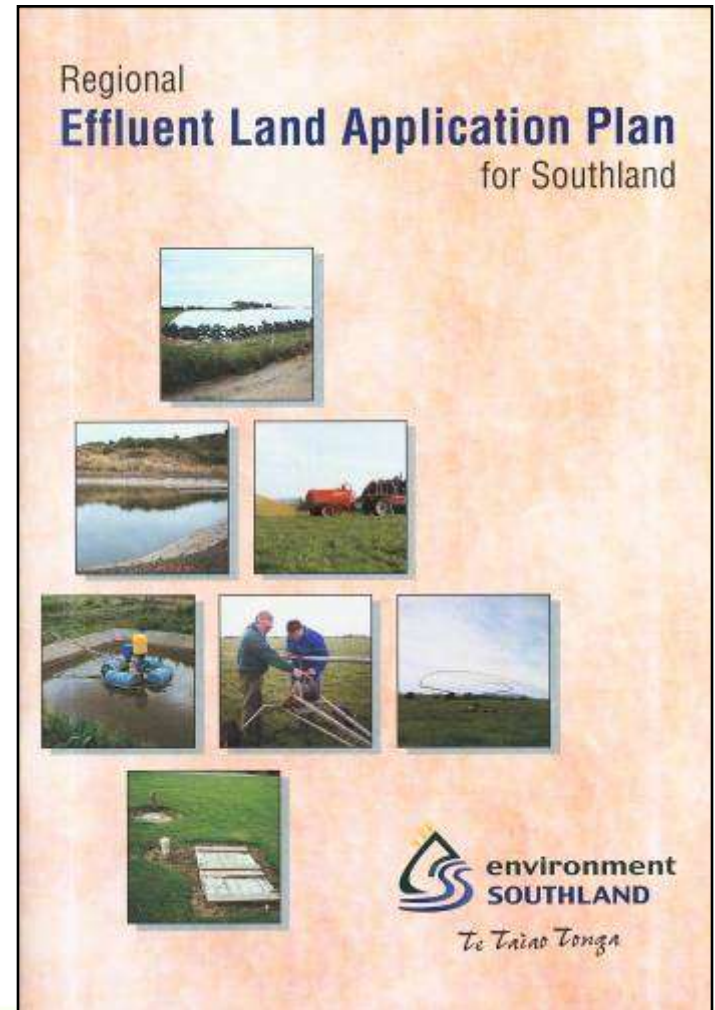
- *What don't you like about the existing approach?*
- *What do you like?*

What's Changed?

Previous Approach	Proposed New Approach
“One-size-fits-all”	What is required is based on level of risk and up to date science
Storage – 60 days for low rate irrigators, 90 days for high rate irrigators	Storage – property specific calculation OR accept defaults. Defaults similar to previous for high risk soils, reduced for low risk soils (i.e 3-6 days)
Application depths the same for everyone	Application depths vary depending on soil type/slope
Maximum consent term of 10 years Written approval requirement	20 year consent terms, no written approvals, streamlined consent process and less compliance monitoring for low-risk operations. Poor history – shorter consents
A number of consent conditions requiring best management practices	Consent conditions requiring best management practices removed
Consent conditions keep changing	MOU so industry involved in future consent condition changes

Discharge Plan

- Regional discharge plans 10+ yrs old.
- Intent to merge these with Water Plan.
- Key means of working towards water quality goals.



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Water quality

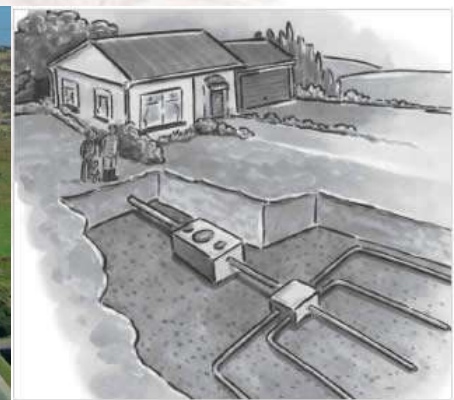
- Top 3 water quality issues in Southland:
 1. Faecal contamination of waterways reducing recreational, cultural and drinking water quality.
 2. Excessive nutrients where they cause nuisance algae or loss of drinking water quality.
 3. Sediment affecting fisheries and ecosystems.



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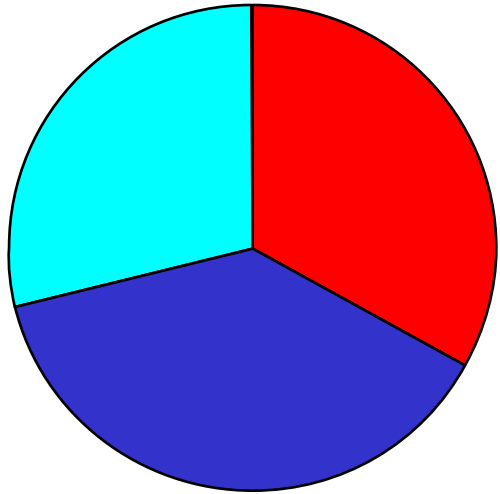
Discharge Plan topics

- Agricultural effluents/sludges
- Waste (e.g. cleanfills, landfills, contaminated sites, hazardous substances)
- Other discharges (e.g. wastewater and industrial/trade)
- Cumulative effects of intensive land use

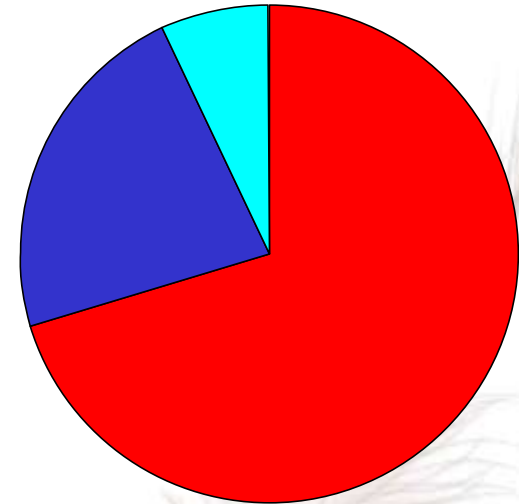
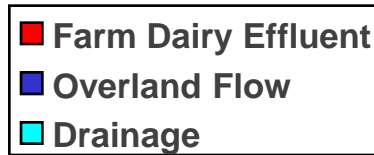


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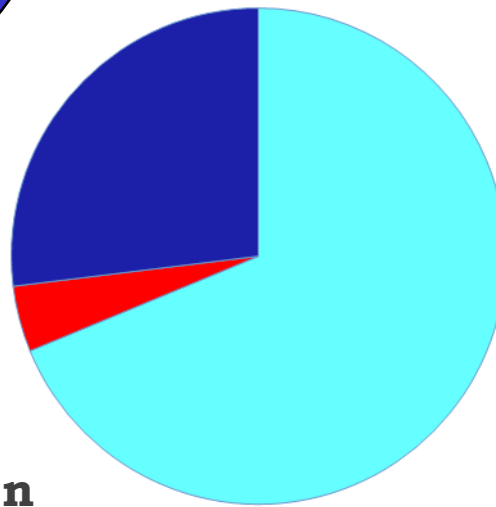
Sources of nutrients and faecal bacteria - milking platform losses



Phosphorus



Faecal bacteria



Nitrogen



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Collaborative process

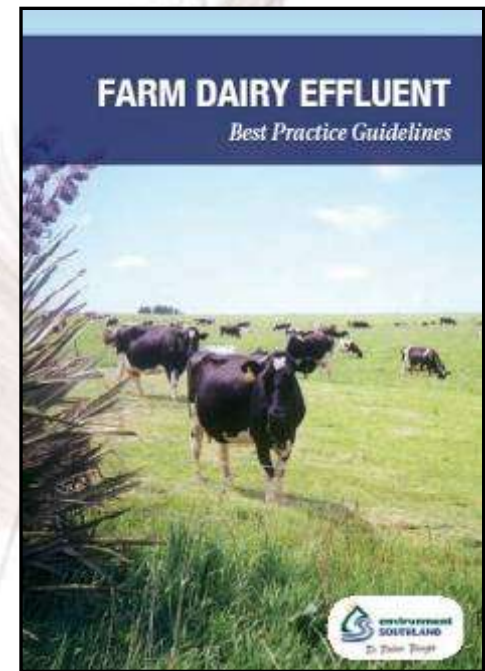
- Workshop with dairy and irrigation industries and AgResearch last year.
- Collaborative working group established.
- New approach based on AgResearch report matching risks associated with soil type/slope and effluent management practices.



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Overview of new framework

- **Step 1:** Council specifies what farmers have to get right
- **Step 2:** Farmer decides how this will be done
- **Step 3:** Inspections/audits to check farmers are getting it right



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Step 1 – Regional Plan

What farmers have to get right

- Based on AgResearch report i.e. effluent applied so that it stays in the root zone.
- Consent requirements linked to level of risk.



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Risk levels

- **Low risk**

- *Irrigation from small scale operations (e.g. less than 20 cows)*
- *Low rate irrigation onto soils with artificial drainage, coarse soil structure, impeded drainage or low rate infiltration rates*
- *Low or high rate irrigation onto well drained flat land*

- **Medium risk**

- *High rate irrigation onto soils with artificial drainage, coarse soil structure, impeded drainage or low rate infiltration rates*
- *Low rate irrigation onto sloping land*
- *Irrigation outside of the mapped soil/slope classes*

- **High risk**

- *High rate irrigation onto sloping land*



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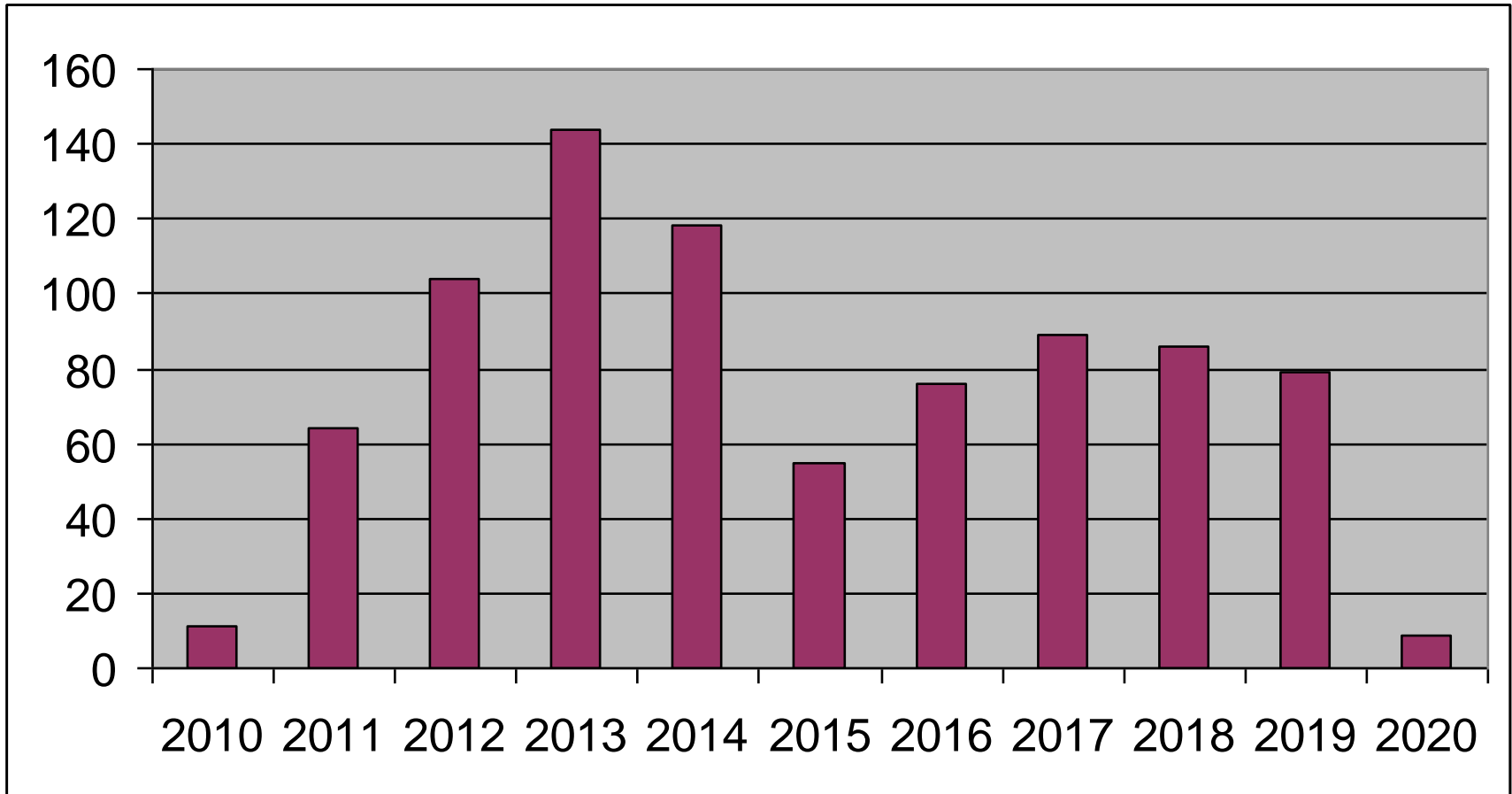
Why move to low risk application?

- Streamlined consent process
- No affected party approvals
- Increased certainty (*longer consent duration, consent must be granted*).
- Reduced inspection/audit requirements



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Consent expiries



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Consent conditions

- Three options:
 - 1: *Adopt “default” consent conditions.*
 - 2: *Refinement of defaults using property specific information.*
 - 3: *Conditions based on detailed plan showing how plan requirements will be met.*
- Specific process put in place for changing default conditions.



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Consent conditions cont'd

Changed conditions:

- **Term** – low risk systems and/or well set up systems, consent terms out to 20 years will be considered.
- **Application depths** – will vary depending on soil/slope.
- **Storage** – property specific calculation OR accept defaults. Defaults similar to previous for high risk soils (60/90 days) but reduced for low risk soils.



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Consent conditions cont'd

Basic requirements to be included:

- property legal description
- specify whether winter milking and/or wintering pad included
- no discharge of effluent to any surface watercourse + no surface run-off/overland flow, ponding or contamination of water
- no offensive/objectionable odour beyond the property boundary or spray drift



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Consent conditions cont'd

- requirement to have a failsafe device
- provision for pulsed irrigation condition (optional and only possible with low rate systems capable of stopping and starting)
- buffer zones
- limit on cow numbers
- plus standard administration conditions for reviews, monitoring & registered drinking water supplies.



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Consent conditions cont'd

Deleted conditions:

- requirement for an anti siphoning device
- irrigation return period
- specification of limits based on total depth of application and cow numbers per hectare but guidance will be included on how these relate to nitrogen applications based on standard data
- withholding period for irrigation after grazing



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Consent conditions cont'd

- requirement for a farm management plan
- requirement to display consent
- However, some of these matters will still be recommended as best practice depending on the method of treatment and disposal of effluent.



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Where to from here?

- **May/June 10** – consultation.
- **July 10** – consent conditions finalised.
- **July 10 to Feb 11** – RMA plan process.
- **Feb 11** – potential minor changes to consent conditions.



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MATCHING FARM DAIRY EFFLUENT MANAGEMENT PRACTICE TO SOIL AND LANDSCAPE RISK

Dave Houlbrooke & Ross Monaghan

AgResearch, Invermay Agriculture Centre, Mosgiel



Farming, Food and Health. **First**™

Te Ahuwhenua, Te Kai me te Whai Ora. Tuatahi

ENVIRONMENTAL RISKS OF FDE LAND APPLICATION

- **System** (application depth & rate, block size, storage)
- **Operational** (application depth, nutrient loading, timing)
- **Receiving environment** (soil and landscape ability to treat applied FDE)

Effluent system and operational management need to be matched to the risk posed by the receiving environment.



FDE – A VALUABLE NUTRIENT RESOURCE

- FDE provides a supply of N, P, K, S, Na, Mg, trace elements, organic matter and water
- Quantity/ratio depends upon feed input, yard management and storage conditions

Overseer® case study comparison

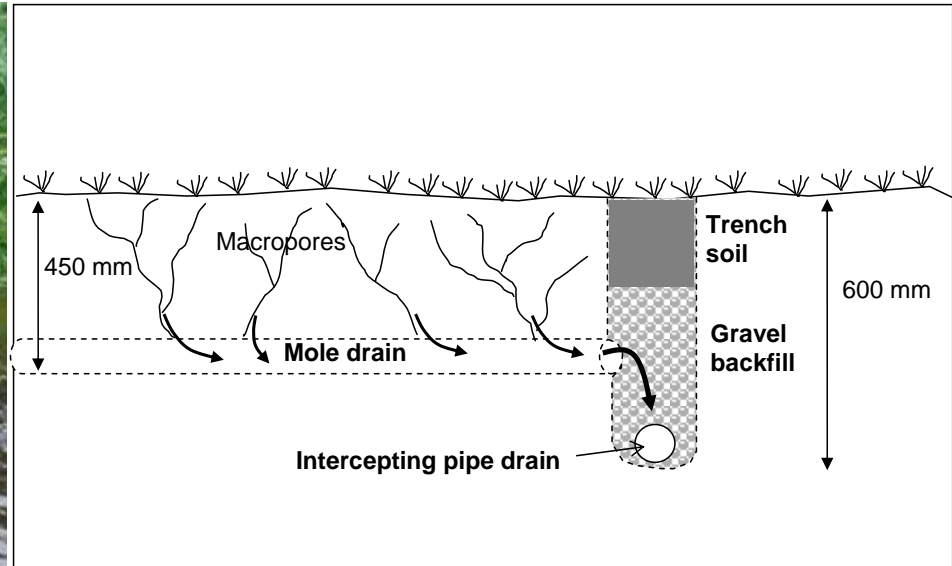
Scenario 1: pasture only (225 ha, 3.2 cows/ha, 1050 kg milk solids/ha/yr)
Estimated total nutrient value = \$33/cow, \$24,000

Scenario 1: high feed input (225 ha, 4 cows/ha, 1330 kg milk solids/ha/yr)
Estimated total nutrient value = \$160/cow, \$115,000



FDE – AN ENVIRONMENTAL RISK

- **Direct contamination of surface water bodies** (runoff & drainage)
- **Ponding** (Saturation vs. Infiltration excess ponding)
- **Infrastructure failure** (storage, equipment)



SOIL & LANDSCAPE RISK FACTORS

Matrix flow

Preferential flow

Surface runoff

Surface runoff

- Slope steepness & length
- Soil moisture content
- Soil infiltration rate
- Ground cover and land use

Preferential flow

- Poor natural drainage
- Coarse soil structure
- Mole and pipe drainage

Matrix flow

- High infiltration rates
- Well drained soil profile
- High porosity
- Fine soil structure

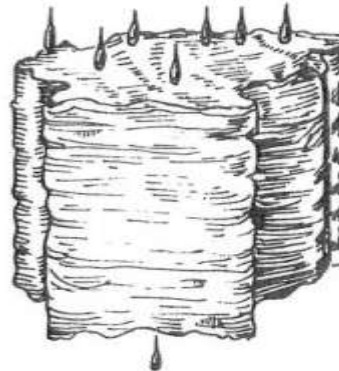
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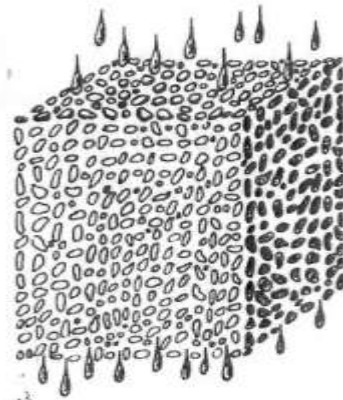
PRISMATIC



MASSIVE



SINGLE GRAIN



BLOCKY



PLATY



RAPID

MODERATE

SLOW

SOIL & LANDSCAPE RISK

Three mechanisms for FDE transport in soils

Surface runoff (avoids soil contact) - **high risk**

Preferential flow (rapid drainage through soil pores/cracks) - **high risk**

Matrix flow (uniform drainage through whole soil profile) - **low risk**



*Photo courtesy of M Mcleod,
Landcare Research*

Raw FDE

**Leachate from
poorly drained
soil**

**Leachate from
well drained
soil**

SYSTEM RISK - Daily sump and spray

- No contingency for breakdowns
- Spring periods are typically wet
- Application depth (mm) > SWD during spring period
- High application rates (mm/hr) & poor control of depth (mm)



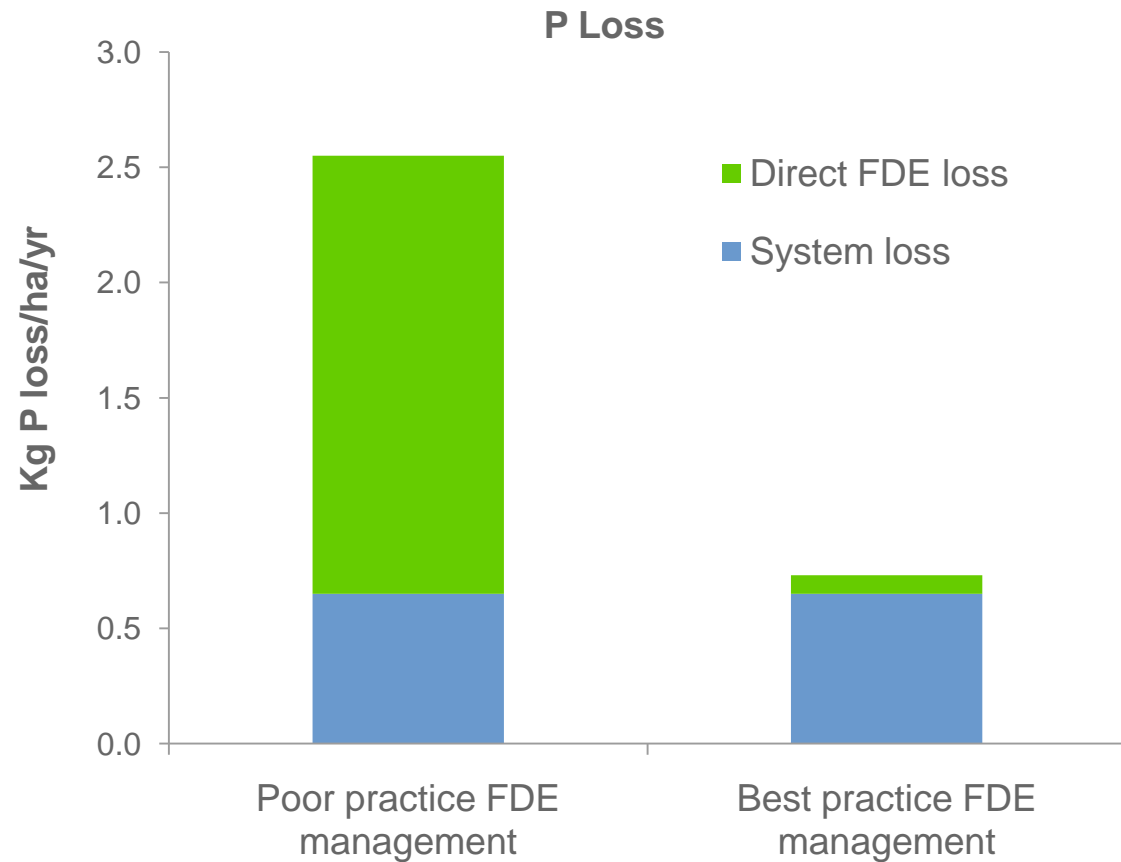
agresearch



MANAGING SYSTEM RISK – Deferred irrigation

FDE application depth < SWD, pond storage when wet

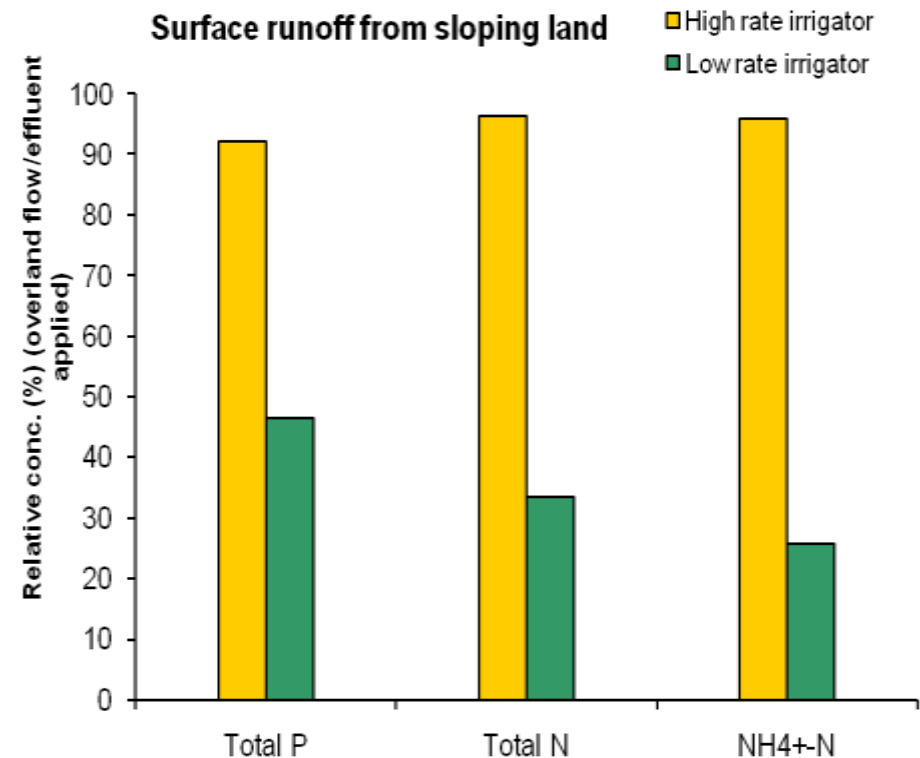
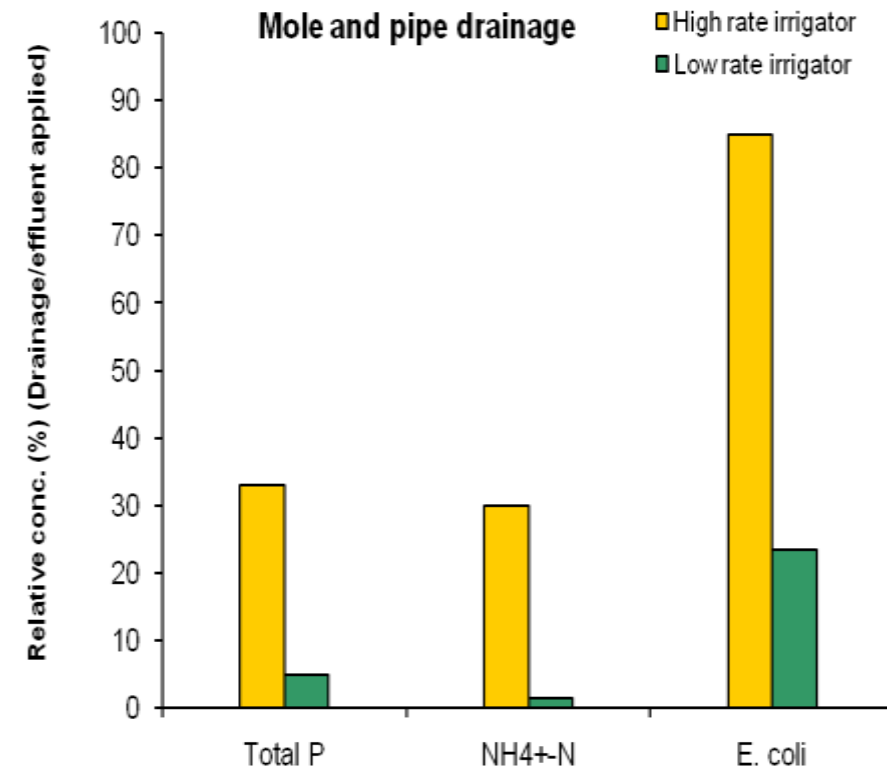
- Applied nutrients stay in the root zone
- Avoid direct losses to water bodies



MANAGING SYSTEM RISK – Low application rate

Low rate applicators

- Low application rate and low depth
- Potential large coverage area
- Filtration effect



SOIL & LANDSCAPE RISK FRAMEWORK

What are the minimum standards for a land application system to meet?

	Category A	Category B	Category C	Category D	Category E
	Artificial drainage or coarse soil structure	Impeded drainage or low infiltration rate	Sloping land (>7°)	Well drained flat land (<7°)	Other well drained but very stony flat land (<7°)
Inherent Risk	High	High	High	Low	Low
Essential management	Deferred irrigation	Deferred irrigation	Deferred irrigation & low rate	Avoid saturation	Low depth, avoid saturation
Recommended management	Low rate	Low rate		Comfort storage	Comfort storage

POND STORAGE CALCULATOR

Developed by Massey University and Horizons Regional Council

- Calculates site specific storage requirement

high risk = deferred irrigation

low risk = avoid saturation (apply at field capacity)

Combination of risk = opportunity to optimise block site and management

- Requires local met data (30 years) and farm management information

i.e. wash down water use, cow numbers, milking season, yard area, irrigation hardware and scheduling strategy

- Provides absolute storage volume (m³)

- Important to consider wet weather when discussing days storage on low risk soils (more than 50 litres/cow).



POND STORAGE CALCULATOR

Bay of Plenty case study

Farm input details:

- 290 cows,
- 617 m² concrete,
- 270 day season,
- 50 L/cow/day wash down water
- 2100 mm annual rainfall



- **100% High risk soils with high rate irrigation = 1800 m³**
- **100% High risk soils with low rate irrigation = 1000 m³**
- **100 % Low risk soils = 400 m³**

SUMMARY

- **FDE is a valuable source of nutrients for plant growth**
- **Land application of FDE poses risks to be managed**
 1. System - infrastructure
 2. Operational - management
 3. Receiving environment – soil and landscape features

Effluent system and management need to be matched to the risk posed by the receiving environment to keep nutrients where they are most valuable.....in the root zone

ACKNOWLEDGEMENTS

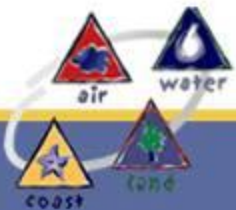
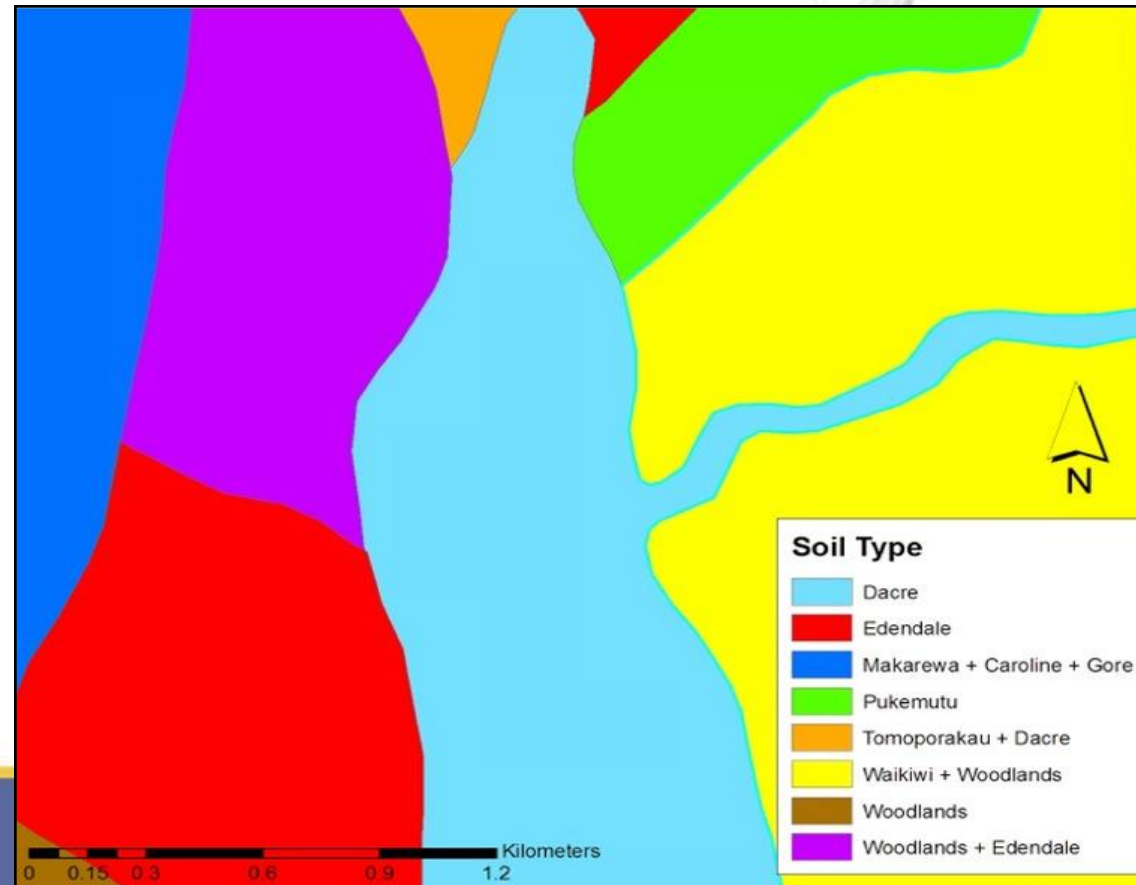
- Dave Horne and James Hanly (Massey)
- Richard Muirhead and Chris Smith (AgResearch)
- Malcolm McLeod and Sam Carrick (Landcare Research)
- Keith Cameron (Lincoln University)



What soil types are on my farm?

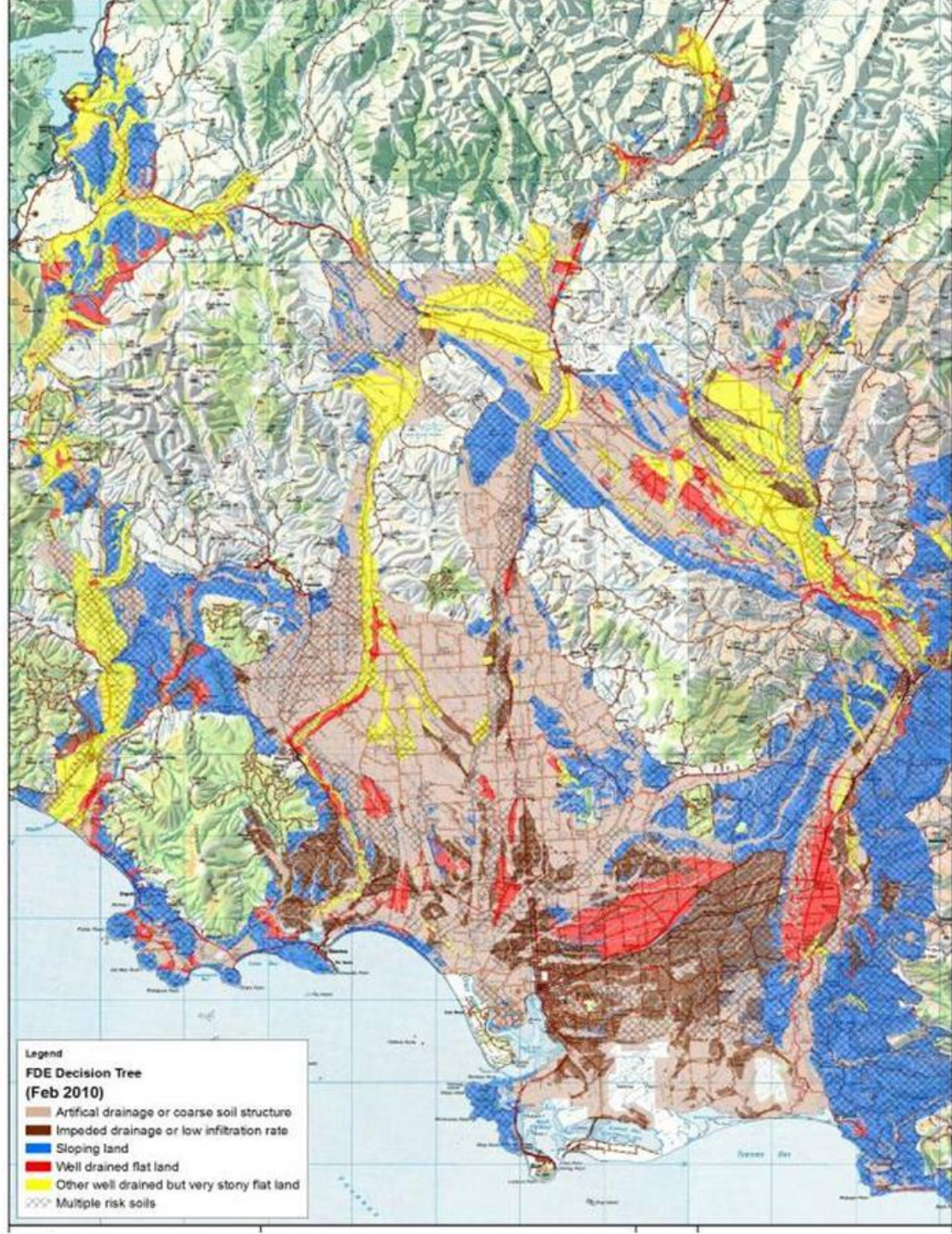
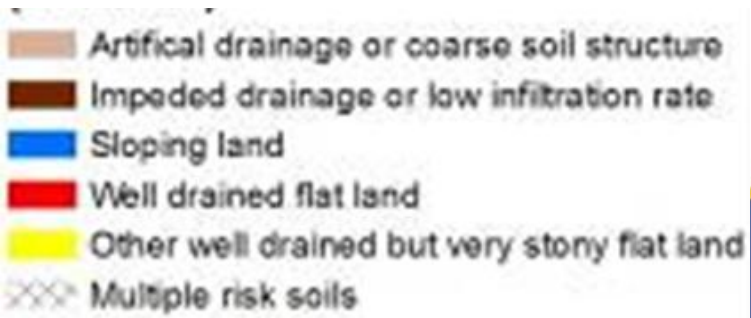
- Southland soils mapped at 1:50,000 scale.
- Often two or more soils are mapped together.
- Soil data available from Environment Southland

- Example soil map
est. 750 ha



Default soil categorisation process

Using local soil data and expert knowledge



Predominate Southland Soil Types

Pallic



Gley



Brown



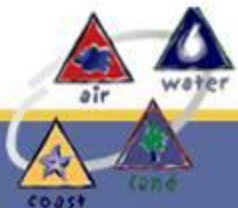
Brown



Brown



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Implementation

- DairyNZ assessment of what is needed to assist farmers work through the new consent process and gaps in capacity
- FDE Standards and Code of Practice
- Warrant of fitness
- AglTO training
- John Engel key contact point in ES if want to take initial steps to new consent now
- New approach to compliance monitoring this season

What's Changed?

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Next steps

- Locate your property on the soils map (consider soil mapping if appropriate).
- Start thinking about an effluent system that will suit your property.
- Identify your likely storage requirements – think about management/contingency factors as well as soil moisture.
- Start talking to suppliers and contractors.
- Register to be kept updated with process.

