

Memo

Date	25 January 2018
To	Ned Norton, Ian Whitehouse
CC	
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Modelling changes in Hurunui and Waiau catchment root zone nitrogen losses from hypothetical scenarios of permitted winter forage development

Method

The current land use and nutrient loss GIS model was updated in January 2018, taking on board feedback from by the Hurunui District Landcare Group. Specifically, the local data gave us an opportunity to more accurately reflect the farm inputs for the extensively grazed easy hill and steep land.

To estimate the effect of winter forage development, we assumed that the Landcare 2016 winter forage crop layer represents the current conditions on the modelled farms. The average area of winter forage cover on modelled dryland farms was 1.8%, although the distribution is highly skewed¹.

For each winter forage development scenario, I modelled the effect of increasing the current area of winter forage activity to 2.5 %, 5.0 % or 10 % of the total farm area. All scenarios restricted the increase to 100 ha of winter forage activity per farm. There was no minimum area assumed, unless the existing area was greater than the scenario maximum. No subdivision of large properties was modelled. Winter forage areas were not increased on irrigated farms.

If an increase in the winter forage activity was possible for a modelled farm, all effective land less than 15 degrees in slope was considered equally likely to be used for the hypothetical increase. I sourced the nutrient loss rates from the MGM dataset.

For reporting, the modelled farms and the modelled root zone nitrogen losses from the farms were grouped:

- according to the sub-catchment making up the largest proportion of the farm, and
- according to the spatial relation to irrigation zones and existing irrigation status. Here, dryland farms were classified into those with 50 ha+ land within the irrigation user/scheme areas (AIC, HWP, NTP, EPI, and Cheviot Irrigators), and all other dryland farms. This was to deal with the uncertainty of future development scenarios associated with some of the identified irrigation zones.

¹ The proportion of farm area classified as winter forage crop is very small on many farms and large on a few farms.

Results

Table 1 summarises the results of how the tested hypothetical scenarios alter the modelled root zone / source nitrogen losses across the main sub-catchments.

Attachments:

File reference:

Farm Catchment	Farm Sub-catchment ¹	Farm irrigation class ²	Current N load (t N yr ⁻¹)	Winter Forage development scenarios (% of farm area)								
				Scenario N load (t N yr ⁻¹)			Absolute Change in N Load (t N yr ⁻¹)			Increase to the Sub-Catchment load (%)		
				2.5%	5.0%	10.0%	2.5%	5.0%	10.0%	2.5%	5.0%	10.0%
Hurunui	Mandamus	Dryland	395	420	420	425	25	25	30	5%	5%	6%
		Dryland farms (within irrigation user areas)	50	55	60	60	5	10	10	1%	2%	2%
		Irrigated farms (>50 ha irrigation)	40	40	40	40	0	0	0	0%	0%	0%
		All	485	515	520	530	30	35	45	6%	7%	9%
	SH1	Dryland	745	815	845	880	70	100	135	3%	4%	5%
		Dryland farms (within irrigation user areas)	695	750	805	880	55	110	185	2%	4%	7%
		Irrigated farms (>50 ha irrigation)	1,125	1,125	1,125	1,125	0	0	0	0%	0%	0%
		All	2,570	2,695	2,775	2,885	125	210	320	5%	8%	12%
	Mouth	Dryland	840	915	950	1,000	75	115	165	3%	4%	6%
		Dryland farms (within irrigation user areas)	790	850	910	1,005	60	120	215	2%	4%	8%
		Irrigated farms (>50 ha irrigation)	1,185	1,185	1,185	1,185	0	0	0	0%	0%	0%
		All	2,815	2,950	3,050	3,190	135	230	375	5%	8%	13%
Waiau	Leslie Hills	Dryland	260	305	325	345	45	65	90	7%	10%	14%
		Dryland farms (within irrigation user areas)	20	25	25	25	5	5	10	1%	1%	1%
		Irrigated farms (>50 ha irrigation)	365	365	365	365	0	0	0	0%	0%	0%
		All	640	695	715	740	50	75	95	8%	11%	15%
	Mouth	Dryland	840	940	1,020	1,110	100	185	275	3%	6%	10%
		Dryland farms (within irrigation user areas)	570	615	675	740	45	105	170	2%	4%	6%
		Irrigated farms (>50 ha irrigation)	1,465	1,465	1,465	1,465	0	0	0	0%	0%	0%
		All	2,875	3,020	3,160	3,315	145	290	440	5%	10%	15%

¹ Farms assigned to catchments based on area.

² Column describes the farm irrigation status, and if a farm has 50 ha+ land within the irrigation zones (AIC, NTP, HWP, EPI and Cheviot Irrigators areas)/

