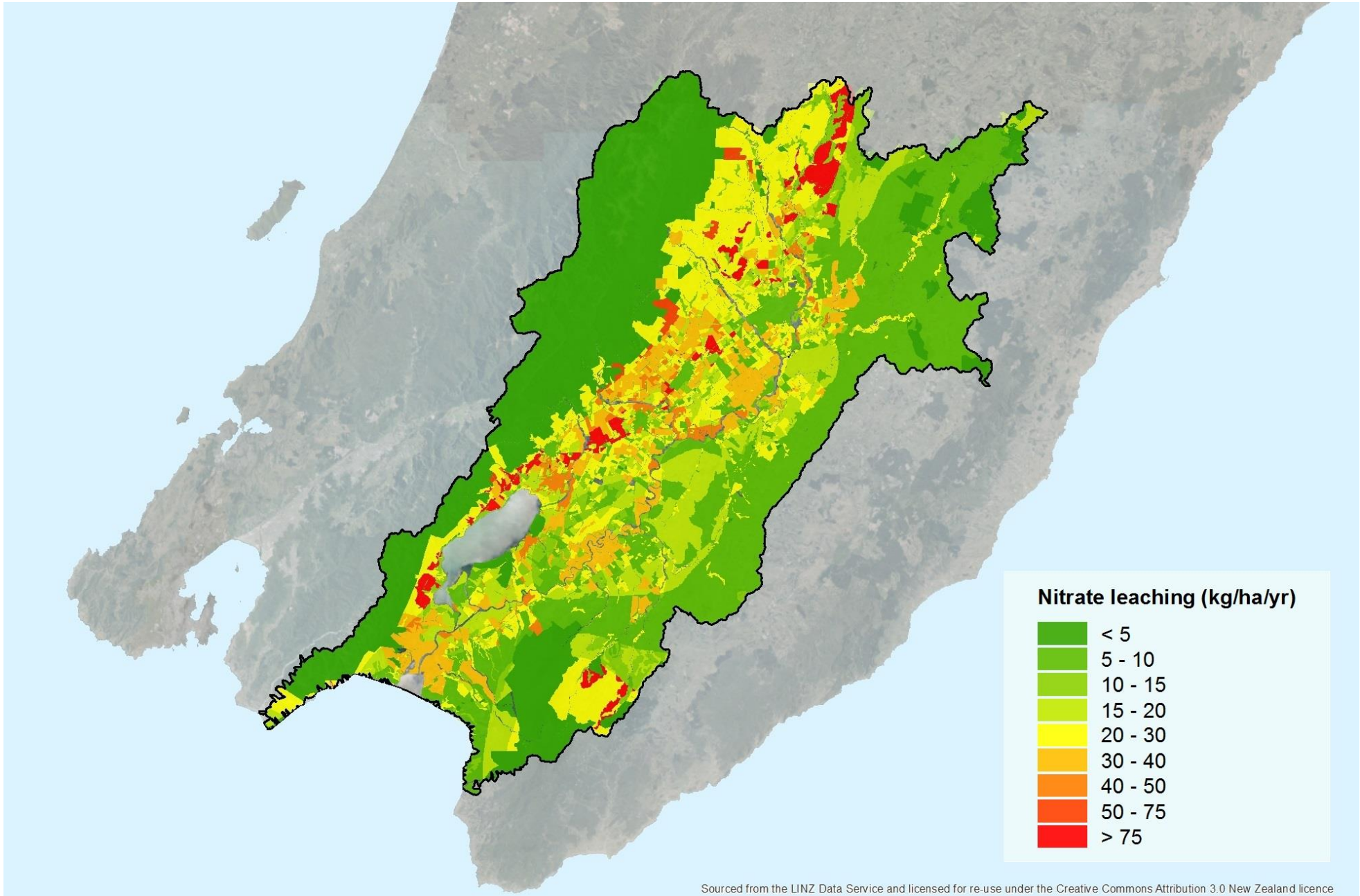


Nutrient load modelling



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Mapping approach – Rep Farm characteristics

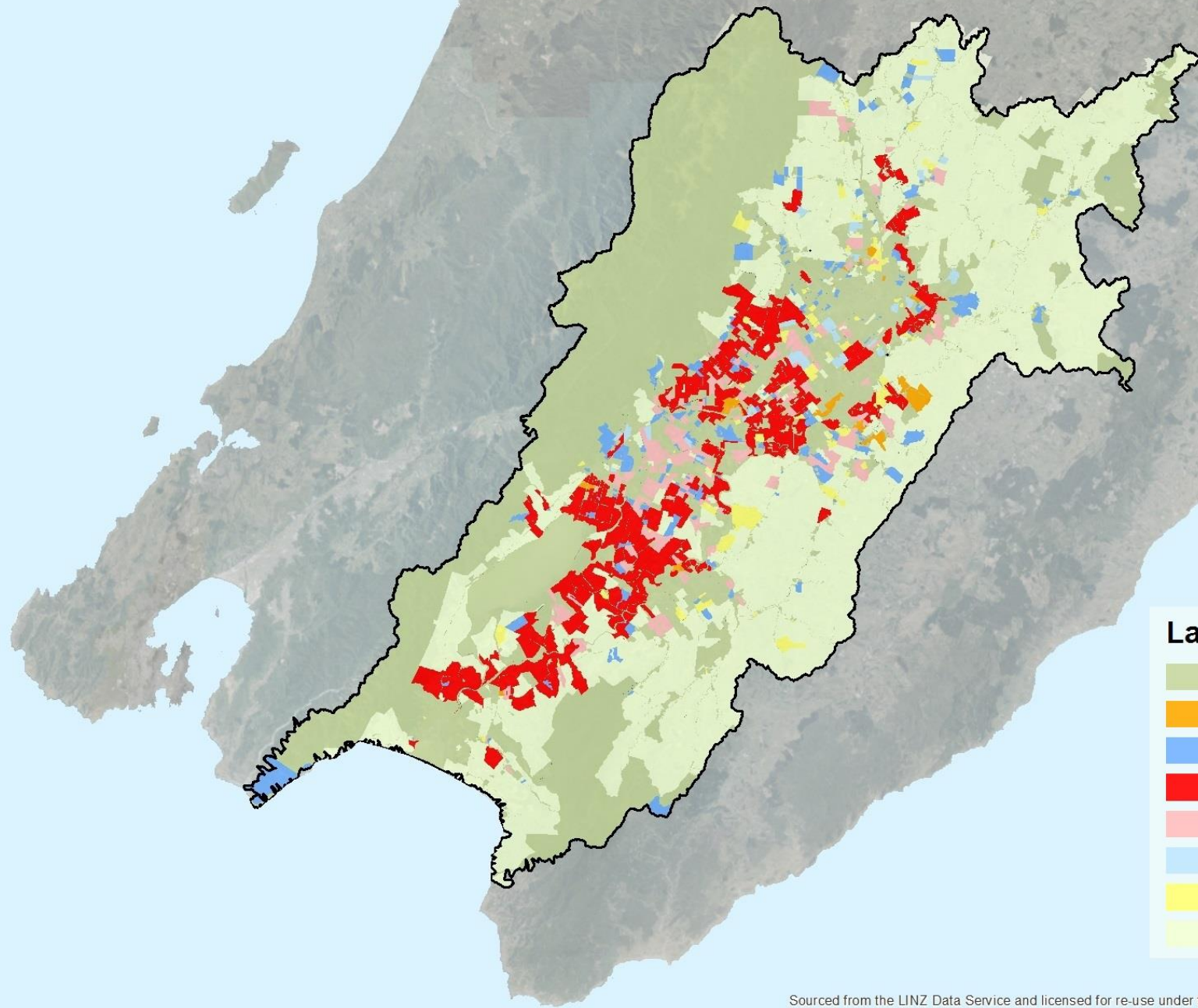
- Actual farms
- Representative farms
 - Primary farm enterprise type
 - Farm system
 - Rainfall zone (climate)
 - Soil type
 - Topography

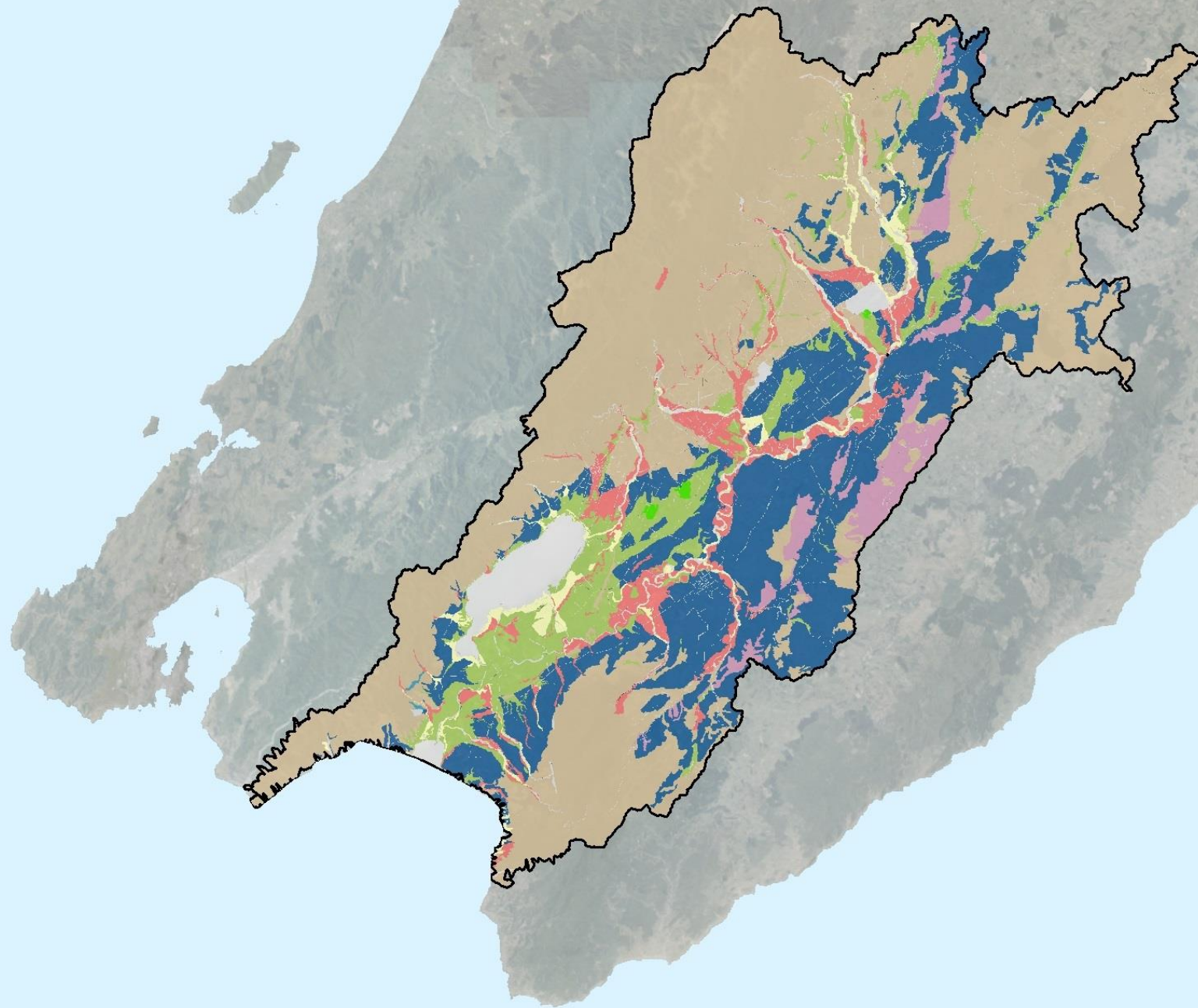
Table 5 Representative farm data for nutrient losses from the “root zone” (results from Overseer)

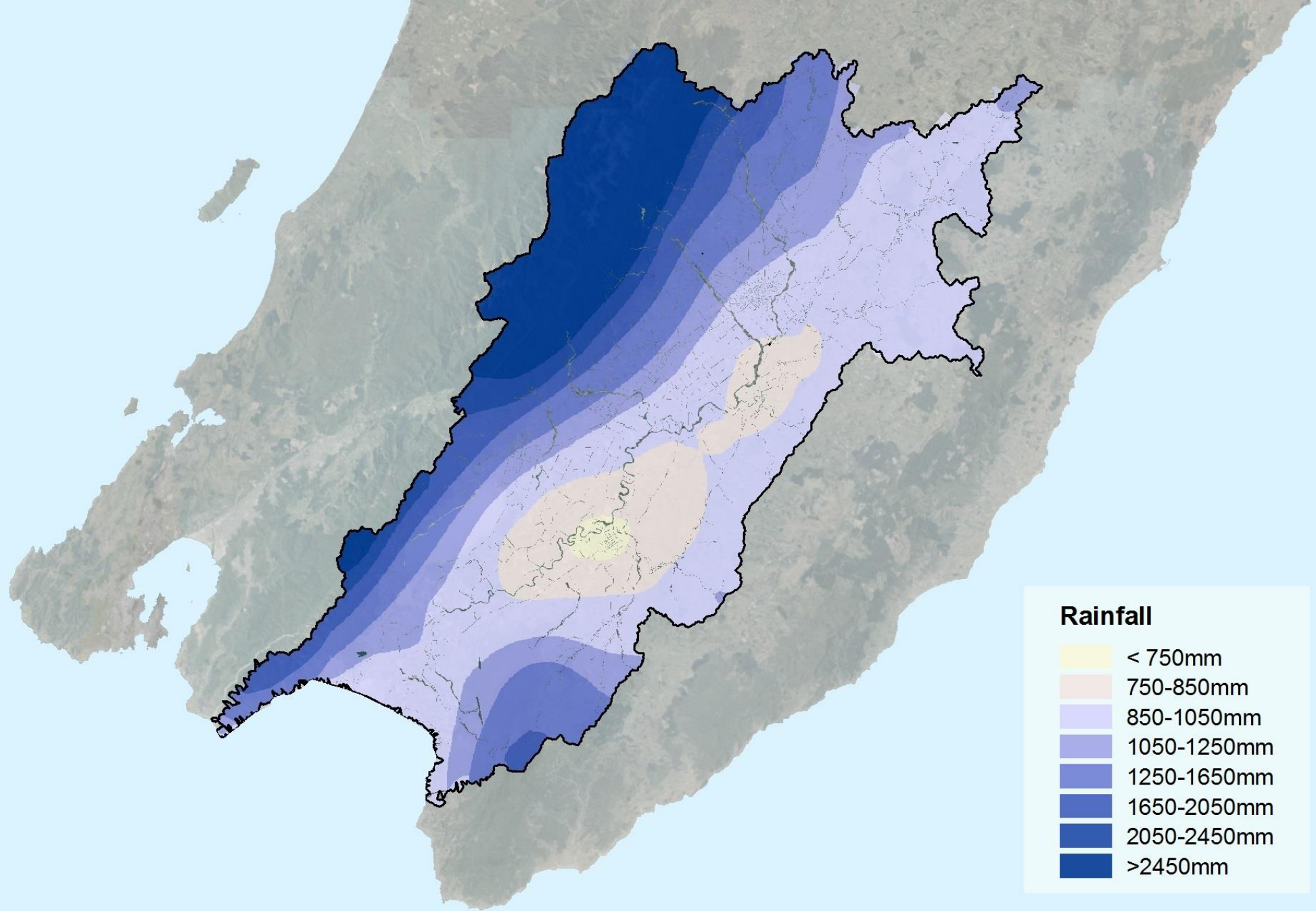
Representative Farm	Farm Background				Leaching and losses to root zone					Runoff to surface water	
	Effective Area (ha)	Relative Stocking Rate (RSU/ha)	Predominant Soil Type (soil order)	Annual Rainfall (mm/year)	Average annual drainage depth (mm)	Average annual nitrate leached (kgN/ha/yr)	Average annual N concentration in drainage water (ppm)	N lost in urine (kgN/ha/yr)	Annual phosphorus loss (kg P/ha/yr)	Average annual N loss in runoff (kgN/ha/yr)	Average annual P loss in runoff (kgP/ha/yr)
Low rainfall dairy, high production	367	37	Pallic	967	514*	42	7.7	37	1.0	0	0.6
Low rainfall dairy, high production	171	21	Gley	1,356	437*	34	3.3	13	1.5	0	0.9
Moderate rainfall dairy	301	28	Pallic	1,100	356*	24	5.1	19	1.2	0	0.9
High rainfall dairy	204	28	Brown	1,546	739	47	5.3 [^]	31	1.7	1	1.3
Irrigated dairy	426	27	Gley	915	510*	24	4.3 [^]	17	0.9	0	0.6
Organic dairy	355	22	Recent	801	409*	35	6.1	30	0.8	0	0.5
Summer wet sheep and beef finishing	450	11.7	Pallic	1,491	696	20	2.3 [^]	11	5.5	1	5.4
Sheep and bulls	927	11.5	Pallic	870	282	9	3.0 [^]	6	0.9	0	0.8
Irrigated sheep and beef trading	360	13.3	Gley	778	323	15	3.9 [^]	8	0.9	0	0.8
Lamb and bull trading 20% cropping	93	17.3	Pallic	880	153	20	6.3 [^]	6	0.6	0	0.3
Sheep and beef breeding, summer dry	620	11.1	Brown	909	279	8	2.7 [^]	6	0.2	0	0.1
Sheep & beef finishing 65% cropping	313	19.3	Pallic	910	334	21	6.0	8	0.5	0	0.4
Low rainfall dairy support 15% cropping	284	10.2	Gley	970	284	15	3.2	7	0.3	0	0.2
High rainfall dairy support 48% cropping	300	19.6	Gley	1300	617	93	14.3	19	1.0	0	1.0

Mapping approach – extrapolation from Rep Farms to Whole Catchment

- Divide the whole catchment up into polygons within which the primary farm type (GWRC land use), soil type and rainfall zone is constant.
- Results in ~ 240 unique combinations of farm type, soil type and rainfall zone.







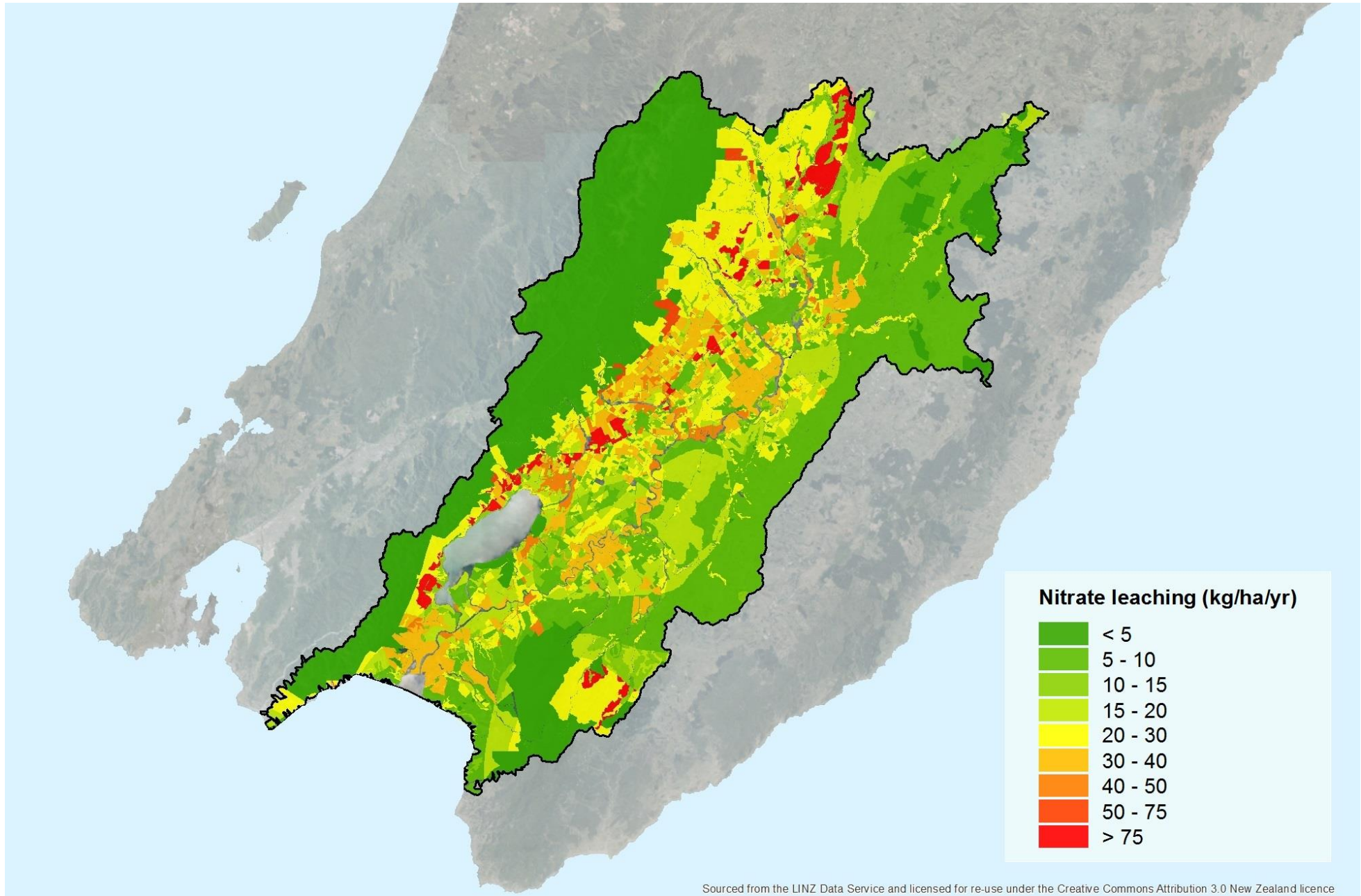


Mapping approach: extrapolation from Rep Farms to Catchment

- Where there was an exact match between the GWRC land use type, soil type and rainfall zone in a polygon and the primary farm type, soil type and rainfall of one of the Representative Farms:
 - *The nitrate load from that rep farm was used directly.*
- Where there was not a direct match a Virtual Farm was defined which has the same farm system as the rep farm that has the same primary farm type as the GWRC land use type and the closest matching soil and rainfall.
 - *The MPI farm modelling team chose the farm system to use for each polygon's Virtual Farm, starting with the largest polygon and working down in size 'till 80% of the farmed catchment area was covered. For some polygons more than 1 Virtual Farm was chosen.*
 - *The farm system used for each of the small polygons covering the remaining 20% of area was chosen by the lead modeller, based on the MPI modelling teams results.*
- The Overseer file for the rep farm system chosen for a polygon's Virtual Farm was used with the polygon's soil type and rainfall in modelling the nitrate load.

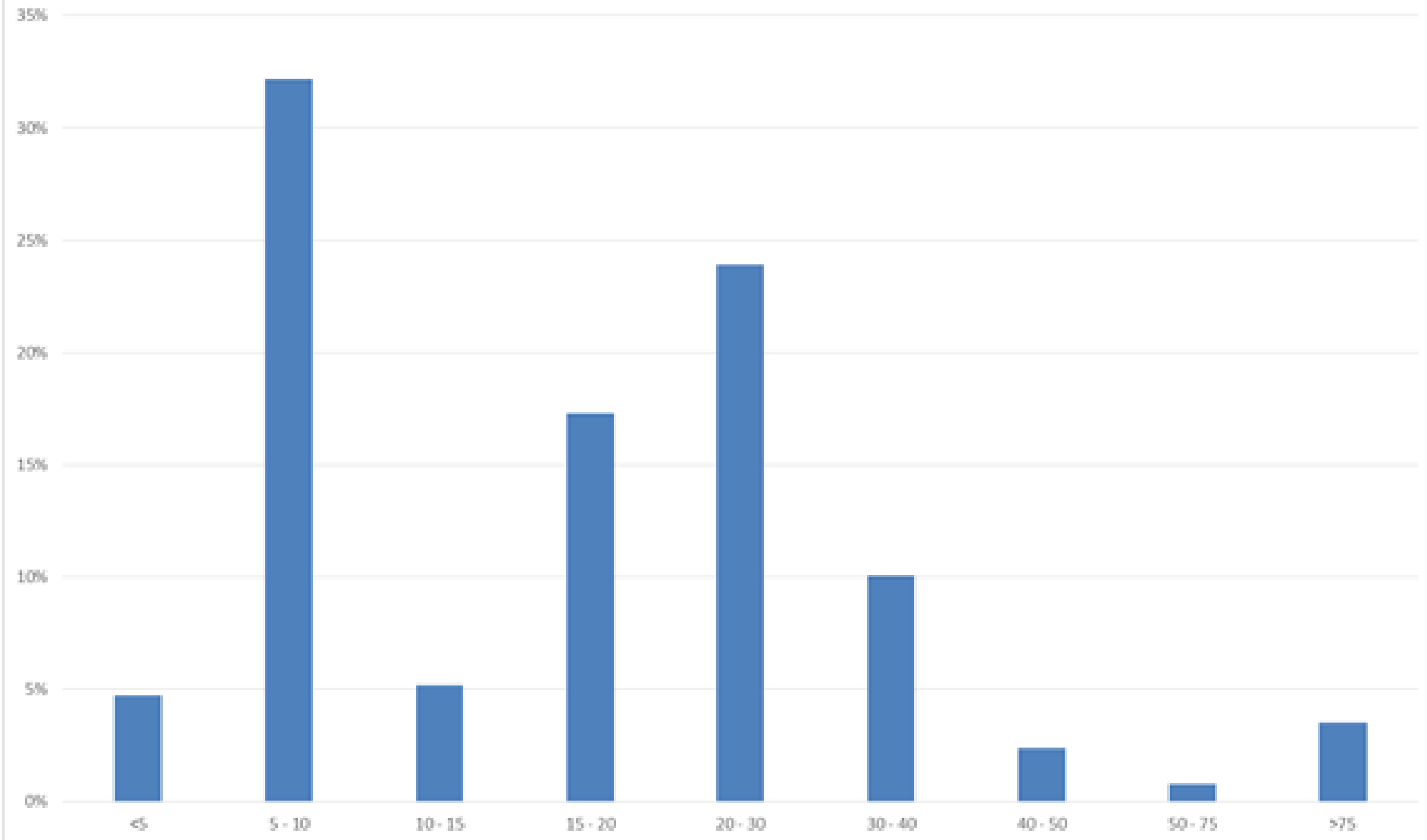
Example: Each row relates to a polygon and is data for either a Rep Farm or a Virtual Farm

Landuse	Soil	Rainfall Band	Total Area (m ²)	Area %	MPI Rep Farm ID	MPI area proportions
Sheep and Beef Farming	BROWN	850-1050mm	324208686	16%	9	100%
Sheep and Beef Farming	PALLIC	850-1050mm	283102789	14%	9	100%
Sheep and Beef Farming	MELANIC	850-1050mm	57961060	3%	9	100%
Beef Farming	PALLIC	850-1050mm	9763157	0%	9	100%
Sheep Farming	PALLIC	850-1050mm	7670188	0%	9	100%
Sheep and Beef Farming	RECENT	850-1050mm	14575937	1%	8b	100%
Beef Farming	RECENT	850-1050mm	2170207	0%	8b	100%
Finishing	RECENT	850-1050mm	1282565	0%	8b	100%
Sheep Farming	RECENT	850-1050mm	825644	0%	8b	100%
Sheep and Beef Farming	GLEY	850-1050mm	33234893	2%	8a, 11a	50%, 50%
Beef Farming	GLEY	850-1050mm	4707425	0%	8a, 11a	50%, 50%
Dairy Farming	BROWN	750-850mm	1053008	0%	2, 4	50%, 50%
Dairy Farming	MELANIC	750-850mm	432402	0%	2, 4	50%, 50%
Dairy Farming	ORGANIC	750-850mm	242400	0%	2, 4	50%, 50%
Dairy Farming	RECENT	750-850mm	16265310	1%	1b(H+L)	50%H, 50%L
Dairy Farming	GLEY	850-1050mm	55383127	3%	1b(H+L)	50%H, 50%L
Dairy Farming	RECENT	850-1050mm	17973883	1%	1b(H+L)	50%H, 50%L

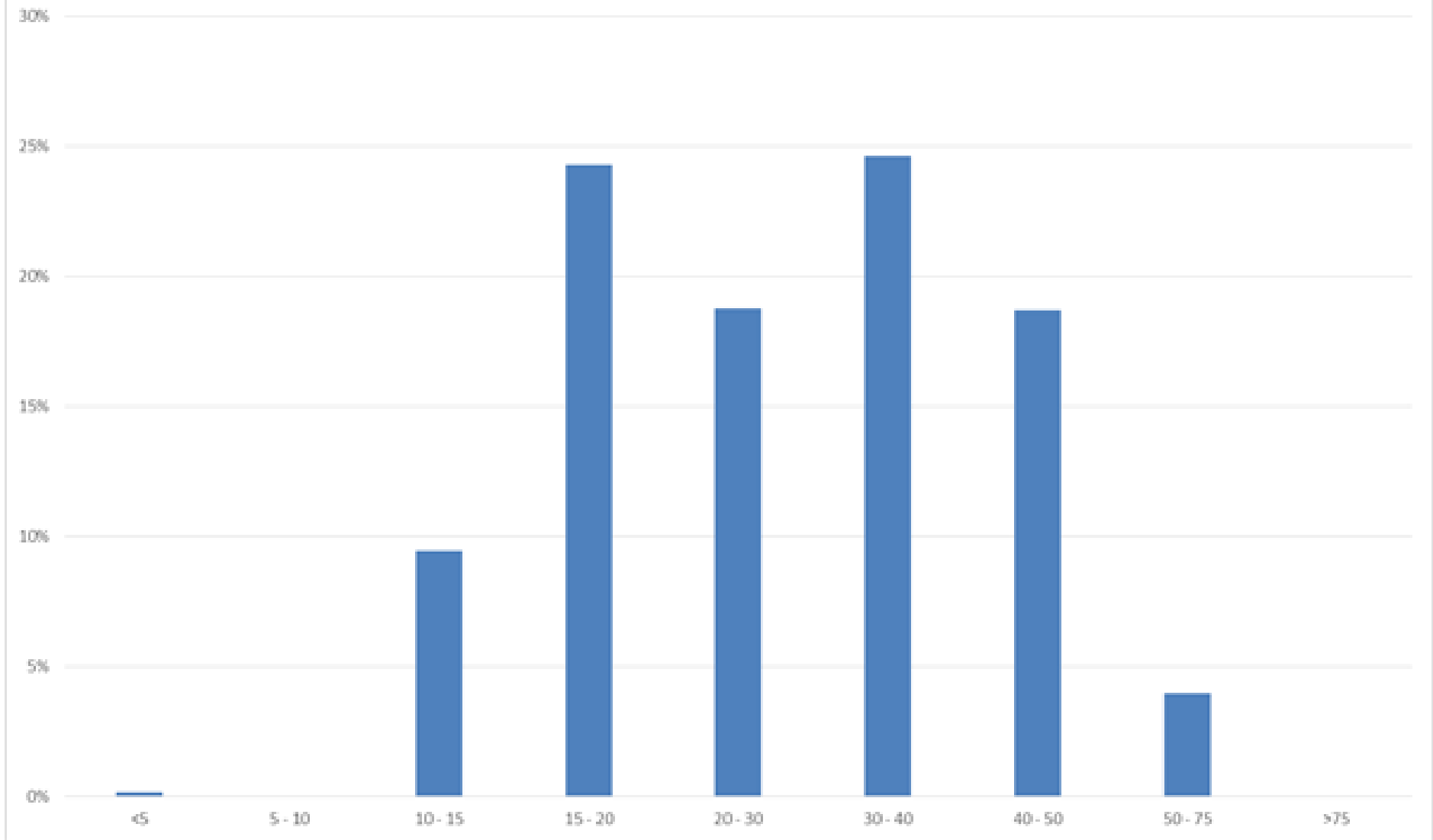


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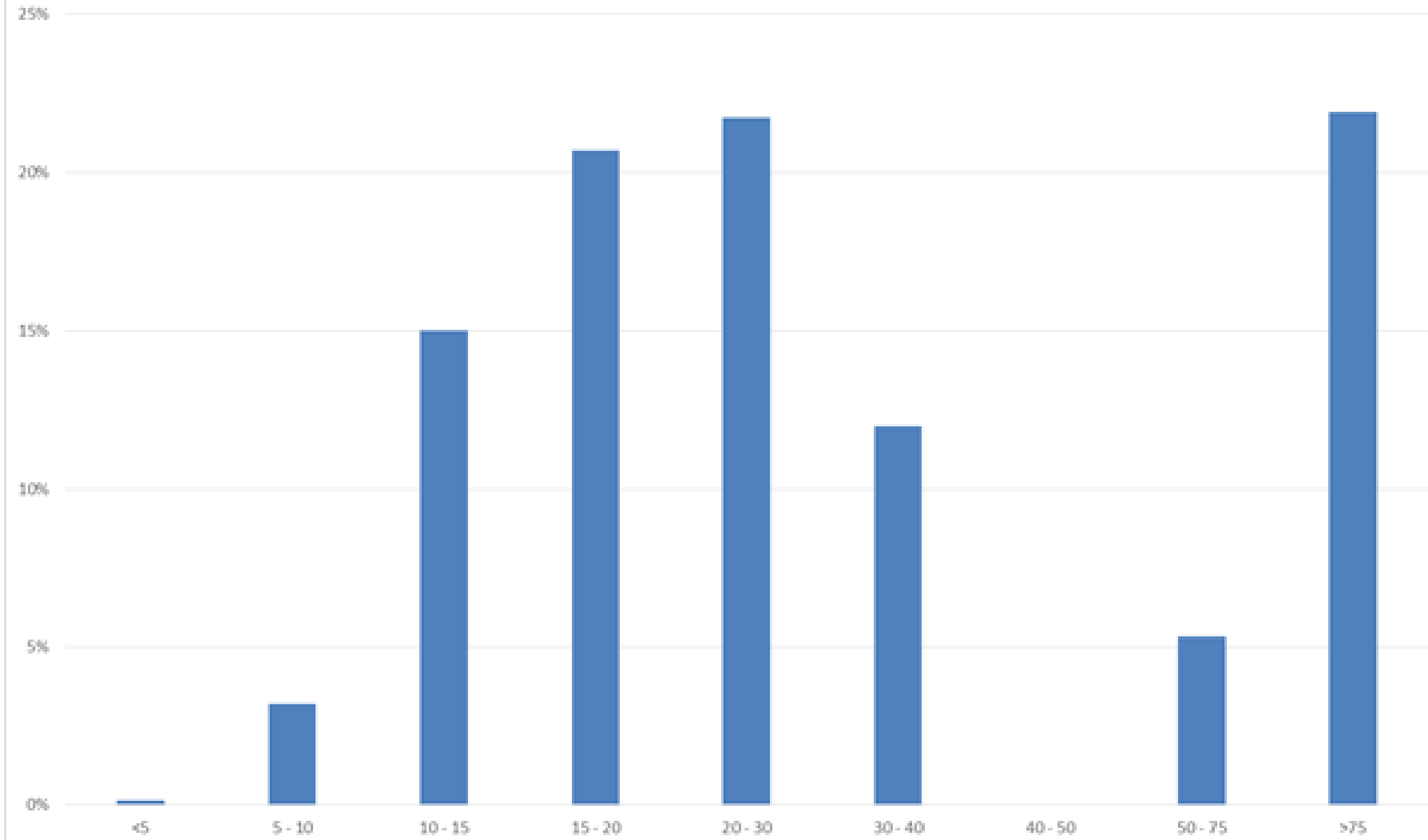
Proportion of Total Developed Rural Area in each Nitrate Leaching class
(version 2)



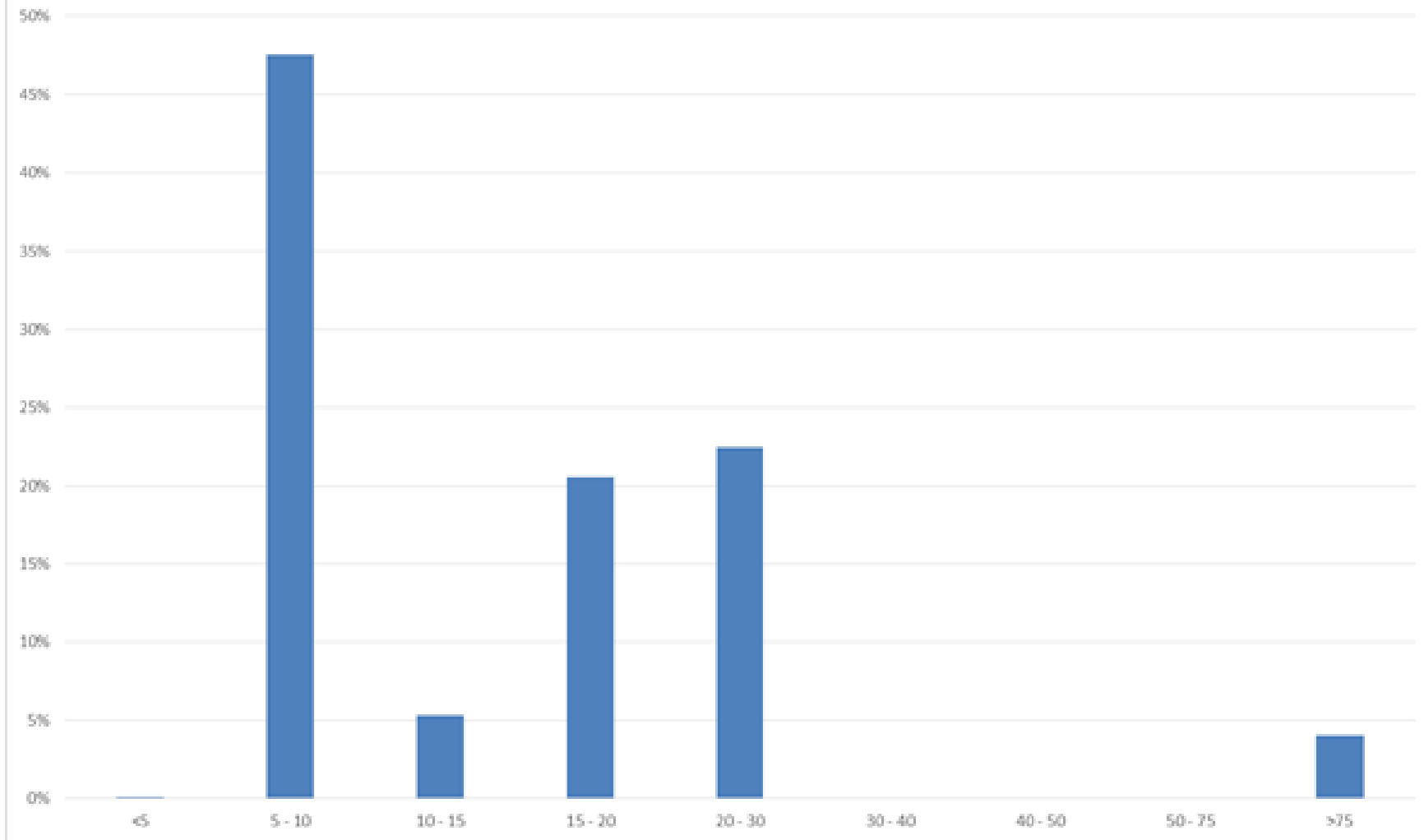
Proportion of Dairy area in each Nitrate Load class
(version 2)



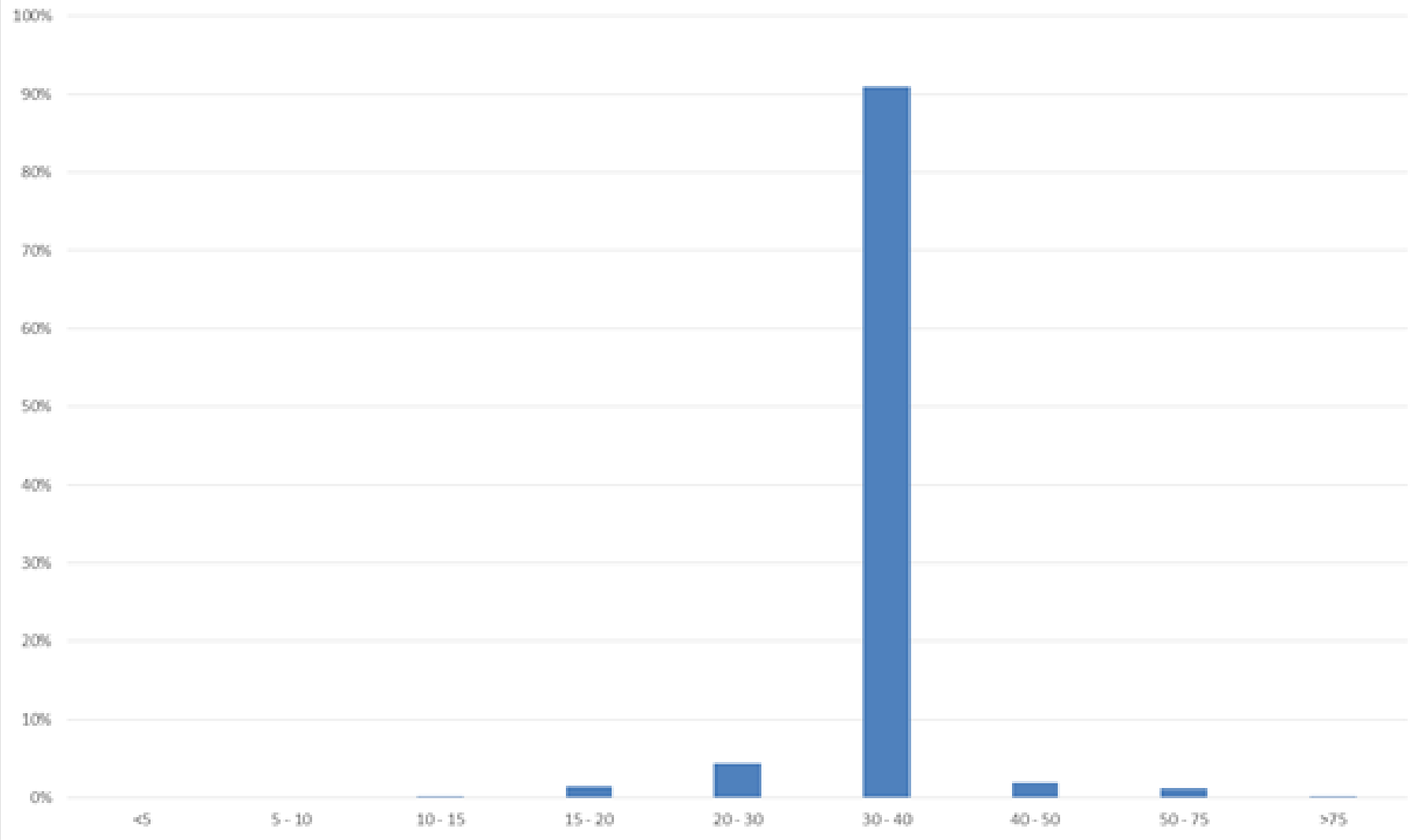
Proportion of Dairy Support area in each Nitrate Load class
(version 2)

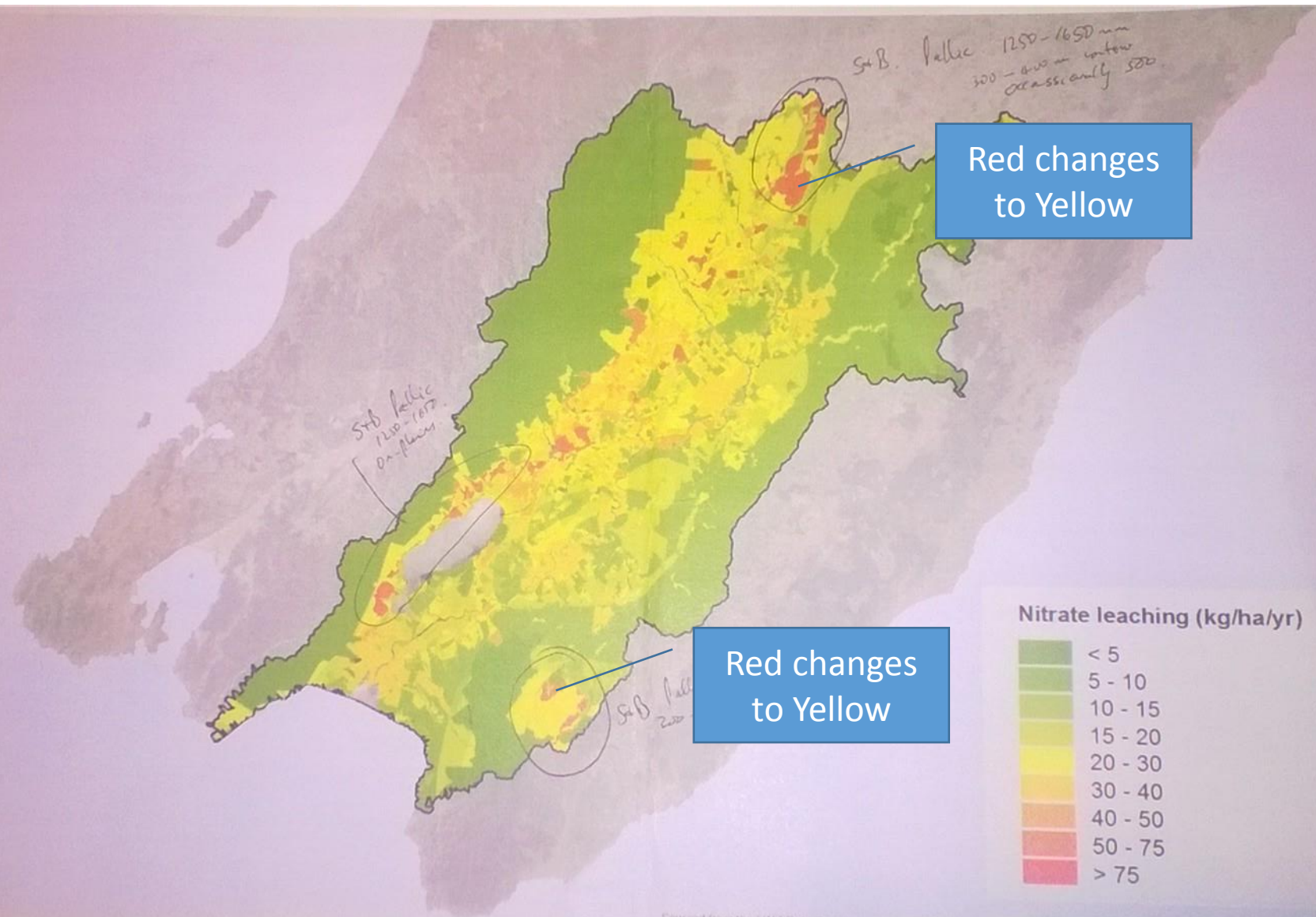


Proportion of Sheep, Beef, Sheep&Beef, Finishing area in each Nitrate Load class
(version 2)



Proportion of Arable/Mixed area in each Nitrate Load class
(version 2)

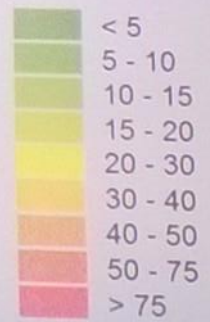




Red changes to Yellow

Red changes to Yellow

Nitrate leaching (kg/ha/yr)



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