

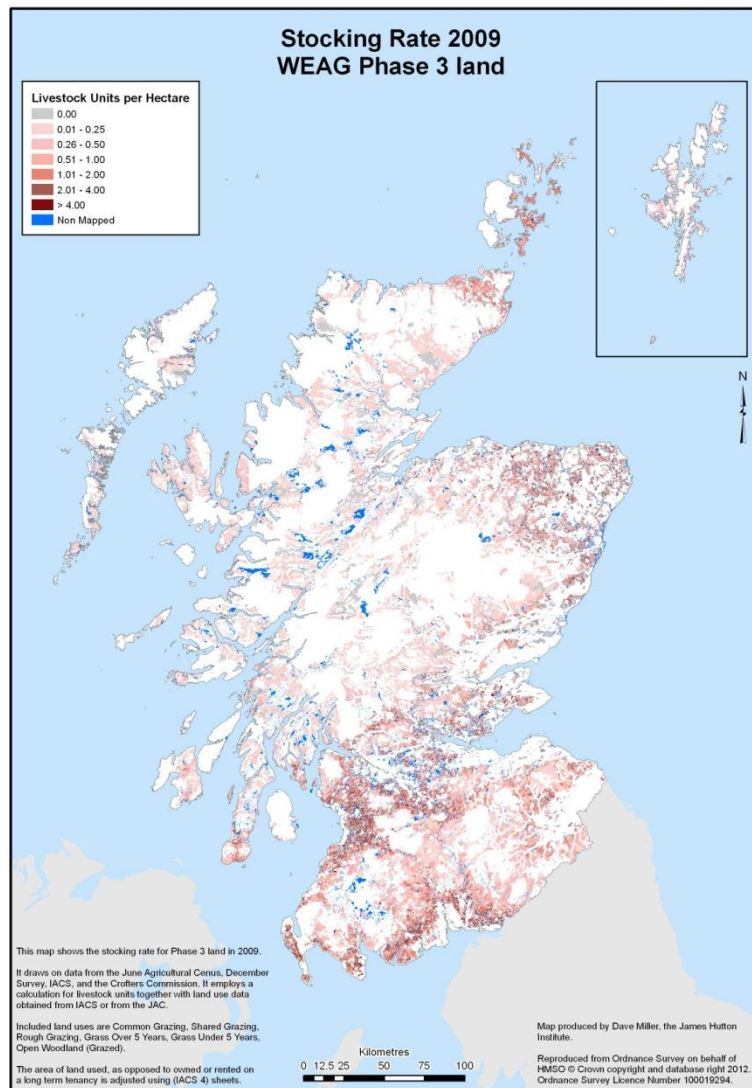
Stocking Rates of Land Capability for Agriculture Classes

Supplementary analysis of the stocking rate characteristics of the Phase 3 land defined by the WEAG-GIS project.

Keith Matthews, Dave Miller, Kevin Buchan



Final Report 2 May 2012



Contents

Executive Summary.....	3
1. INTRODUCTION.....	6
2. METHODS AND MATERIALS.....	6
3. RESULTS.....	7
3.1. Phase 3 Land Coverage.....	7
3.2. Phase 3 Stocking Rates.....	8
3.3. Area Weighted Average Stocking Rates.....	10
3.4. Distribution of Stocking Rates per LCA Grouping.....	11
3.5. Stocking Rate Mix per Region.....	18
4. SUPPORTING ANALYSES.....	24
4.1. LCA Mix per Region (Phase 3).....	24
4.2. Forage Area Characteristics (Phase 3).....	25
5. SUPPORTING TABULAR DATA.....	27
5.1. Phase 3 Areas – Mapped, Forage, Stocked and Unstocked.....	27
5.2. Livestock Numbers per AgRegion and LCA Grouping.....	29
5.3. Forage Areas for SR ranges.....	29
5.4. Weighted Average SRs for SR ranges.....	33

Executive Summary

This document presents an analysis of the stocking rate (SR) characteristics of the Phase 3 area (land most likely to have potential for woodland expansion) as defined by Towers et al. (2011)ⁱ. This is a supplementary analysis based on data and methods presented by the authors in a previous reportⁱⁱ to WEAG.

Matthews, K.B., Miller, D.G. and Buchan, K. (2012) *Stocking Rates of Land Capability for Agriculture Classes: Estimating the stocking rate characteristics of groupings of Macaulay Land Capability for Agriculture classes in the regions of Scotland*. (37 pp). Woodland Expansion Advisory Group.

The authors' previous analysis combined potential for use as summarised by Macaulay Land Capability for Agriculture (LCA) with actual use as summarised by the SR's. These SR values were derived at field or holding level from Integrated Administration and Control System (IACS) and June Agricultural Census data (see Section **Error! Reference source not found.** of the main report for details of data and methods). The results were summarised using grouping of the LCA classes, Arable, Mixed, Improved, Rough and Other and by Agricultural Region (AgRegion). This report undertook the same analysis but only for the subset of land included within Phase 3

As noted in the previous report there is significant variation in, and skewed distributions of, stocking rate within LCA class groupings for each AgRegion. This uncertainty needs to be borne in mind when making use of average SR values. For the Phase 3 land the distributions of SR for AgRegion and LCA Grouping are presented in Section 3.4 and tabulated in Section 5.4).

Area weighted averages of SR do, however, provide for the Phase 3 land an overview of the likely consequences, for livestock numbers, of changes to woodland areas, on the combinations of LCA and AgRegion. The table below presents a cross-tabulation of average SR values for LCA and AgRegion. The table is colour coded to highlight combinations where SR is below 1.0 (in shades of purple) and above 1.0 in shades of green. These values are broadly similar to those in the previous report for the Mixed, Improved and most of the instances of the Rough LCA class groupings (the differences are tabulated in Section 3.3). Note that while no LCA Arable should appear within the Phase 3 area, differences in the scale of mapping used for the SR-LCA analysis and the definition of Phase 3ⁱⁱⁱ mean that approximately 18% of the LCA Arable area (85,483 Ha) has been included in this analysis.

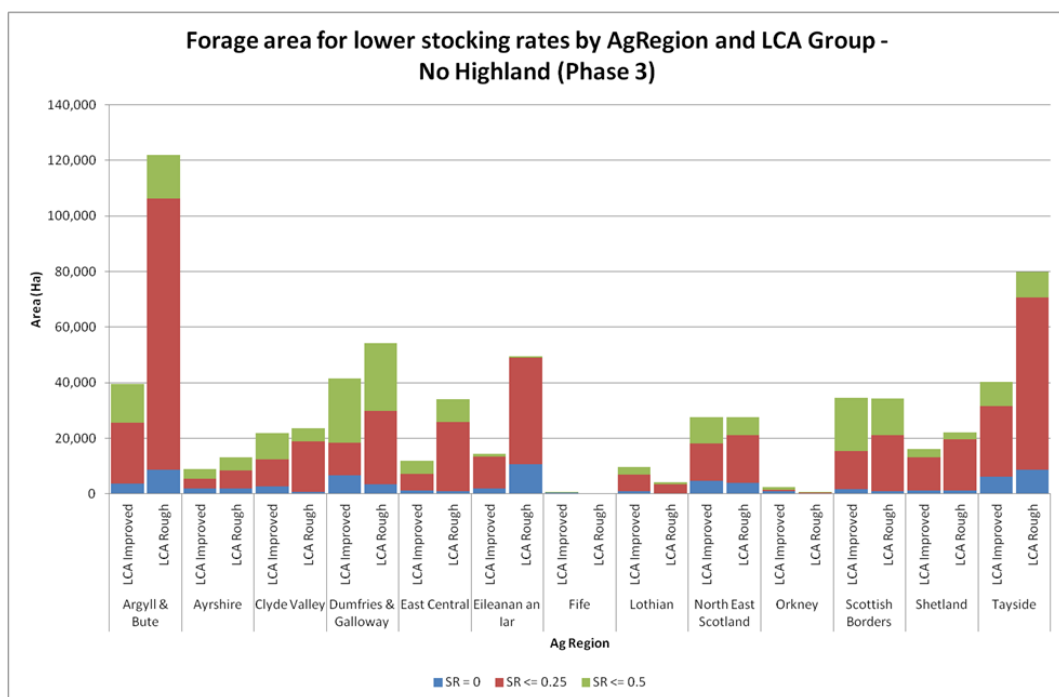
ⁱ Towers, W., Sing, L., Miller, D.G., Matthews, K.B., Ray, D. (2011). *Woodland Expansion GIS project - Further Analysis*. Available: <http://www.forestry.gov.uk/website/forestry.nsf/byunique/infd-8phmau>. Last accessed 12th March 2012.

ⁱⁱ http://www.macaulay.ac.uk/LADSS/research_policy.html

ⁱⁱⁱ The SR-LCA analysis used the hybrid LCA map which has 1:50,000 scale mapping in lowland areas rather than 1:250,000 scale of the Phase 3 mapping. The 1:50,000 scale mapping retains smaller pockets of prime land (LCA classes 1-3.1).

AgRegion	LCA Group					
	Arable	Mixed	Improved	Rough	Other	All LCA
Argyll & Bute	1.06	0.68	0.32	0.14	0.08	0.24
Ayrshire	1.09	1.18	0.70	0.35	0.31	0.95
Clyde Valley	0.97	0.91	0.50	0.25	0.23	0.67
Dumfries & Galloway	1.39	1.19	0.78	0.38	0.38	0.84
East Central	0.67	0.66	0.37	0.18	0.16	0.42
Eileanan an Iar		0.14	0.13	0.08	0.05	0.09
Fife	0.51	0.79	1.19	0.80	0.25	0.71
Highland	0.36	0.49	0.15	0.08	0.07	0.15
Lothian	0.51	0.70	0.45	0.31	0.21	0.52
North East Scotland	0.67	0.81	0.39	0.21	0.18	0.68
Orkney		0.94	0.85	0.56	0.19	0.90
Scottish Borders	0.73	0.76	0.54	0.28	0.17	0.56
Shetland		0.21	0.20	0.17	0.05	0.18
Tayside	0.32	0.59	0.30	0.15	0.07	0.32
No Region	0.05	0.03	0.01	0.03	0.01	0.07
All Regions	0.65	0.84	0.42	0.16	0.18	0.46

The outputs from the SR-LCA analysis can also be summarised to provide indications of the areas of grazing associated with SR values. This could be effective in highlighting where there may be opportunities for additional woodland on land with lower SR values. As in the main report in all regions there are substantial areas with SR's below 0.5 lsu/ha. The figure below illustrates these areas for the LCA Improved and Rough groupings. For clarity the figure omits Highland AgRegion since this has ~500,000 ha of LCA Rough with SR less than 0.5 lsu/ha.



Compared with the previous report the areas available are substantially reduced, for example Highland from 1.5M ha to 0.5M ha. The overall AgRegion pattern remains similar with Argyll and Bute and Tayside having the largest areas after Highland. Both the North East of Scotland and Western Isles see large reduction in potential area using Phase 3 definitions leaving Dumfries and Galloway as having the third largest potential area.

As previously noted a number of caveats and potential improvements to the analysis have become apparent during the course of the research (see Section 4 in the main report). None of these is sufficiently serious so as to undermine the validity of the results presented but some would merit further analysis. Further research is also required to determine how best to combine the SR values with other spatial datasets to allow assessment of within region patterns.

1. INTRODUCTION

This document presents an analysis of the stocking rate characteristics of the Phase 3 land as defined by Towers et al. (2011)¹:

- Phase 1: Land that is predominantly not available for woodland expansion.
- Phase 2: Land that is affected by national designations and policies which impose varying degrees of constraint on woodland expansion.
- Phase 3: Land that is not excluded in the first two categories and which is therefore most likely to have potential for woodland expansion.

This is a supplementary analysis based on data and methods presented by the authors in a previous report to the Woodland Expansion Advisory Group (WEAG).

Matthews, K.B., Miller, D.G. and Buchan, K. (2012) *Stocking Rates of Land Capability for Agriculture Classes: Estimating the stocking rate characteristics of groupings of Macaulay Land Capability for Agriculture classes in the regions of Scotland*. (37 pp). Woodland Expansion Advisory Group

As before the analysis combines potential for use as summarised by Macaulay Land Capability for Agriculture (LCA) with actual use as summarised by the SR's. These SR values are derived at field or holding level from Integrated Administration and Control System (IACS) and June Agricultural Census data (see Section 2 of the main report for details of data and methods). The results are summarised using groupings of the LCA classes, Arable (1-3.1), Mixed (3.2-4.2), Improved (5.1-5.3), Rough (6.1-7) and Other and by Agricultural Region (AgRegion)

2. METHODS AND MATERIALS

The overall approach taken in the previous analysis (SR-LCA) is outlined in Figure 1. This can be summarised as four data integration and analytical steps:

- Define and map the potentially grazed area and attribute users;
- Derive stocking rates for the potentially grazed area;
- Derive the LCA mix for the potentially grazed area;
- Summarise the stocking rates present by groups of LCA class and administrative regions.

For this analysis a subset of the combined SR-LCA mapping was derived by overlaying the SR-LCA map with the Phase 3 map derived by Towers et al. (2011)¹.

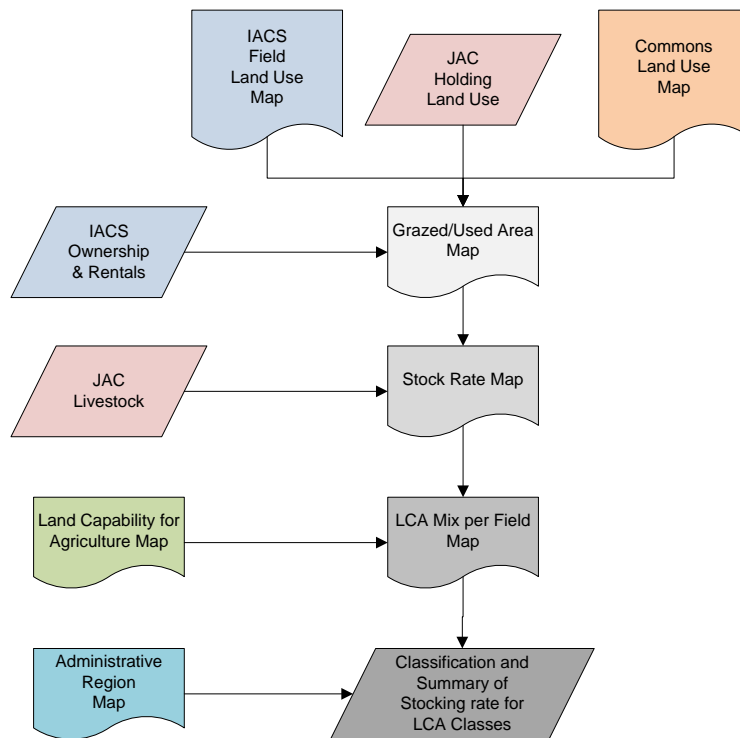


Figure 1

3. RESULTS

3.1. Phase 3 Land Coverage

The Phase 3 land comprises 2.67M Ha. The SR-LCA mapped coverage of Phase 3 land is 90%, see Table 1. The land use data for this coverage is predominantly derived from field level data (88%) supplemented by holding data (5%) and common grazings (7%).

Table 1

Type	Area (ha)	%
All Phase 3 land	2,666,856	-
Mapped cover	2,401,694	90
Non mapped	265,162	10
Field – non-forage	196,683	8
Field - forage	1,910,273	80
Holding	119,276	5
Common	175,462	7

Table 2 shows a breakdown of the LCA areas in hectares for each AgRegion in the Phase 3 land.

Note that while by definition LCA Arable should not appear in Phase 3 land (it is part of Phase 1), 85,483 ha (18%) of LCA-Arable is included within the combined SR-Phase 3 mapping. This occurs since the SR-LCA analysis used the hybrid LCA mapping which combines 1:50,000 scale mapping in

the lowlands with 1:250,000 scale mapping elsewhere, whereas the Phase 3 mapping used the 1:250,000 scale mapping alone. The hybrid LCA mapping better differentiates small areas of LCA-Arable within an overall mosaic of LCA classes otherwise dominated by Mixed or Improved classes. This has the cumulative effect of defining a larger area as prime land (LCA classes 1-3.1). This area is, however, a small proportion (3.2%) of the overall area of Phase 3 land.

Differences in the coastlines between the SR-LCA and Phase 3 datasets also result in small areas of LCA-Unmapped (Phase 3 mapping but no LCA) and No Region (Phase 3 mapping but no region mapping).

Table 2: LCA Areas (Ha) for Phase 3 land

AgRegion	LCA Arable	LCA Mixed	LCA Improved	LCA Rough	LCA Other	LCA Unmapped	All LCA
Argyll & Bute	549	21,848	55,650	152,051	2,553	401	233,052
Ayrshire	8,352	93,796	23,114	25,020	3,491	44	153,817
Clyde Valley	6,655	89,210	40,898	28,447	10,238	6	175,454
Dumfries & Galloway	4,664	115,426	104,312	80,465	2,100	71	307,038
East Central	2,063	41,250	17,468	37,549	2,573	14	100,917
Eileanan an Iar		3,191	17,033	53,732	2,087	853	76,897
Fife	13,389	27,629	4,706	1,082	3,603	43	50,452
Highland	3,029	84,828	146,445	469,805	5,418	617	710,141
Lothian	9,393	21,538	16,779	5,695	2,986	17	56,409
North East Scotland	14,075	221,455	42,025	36,059	2,254	53	315,921
Orkney		28,708	8,657	1,613	144	146	39,269
Scottish Borders	3,901	53,242	70,082	40,289	220	59	167,793
Shetland		2,622	18,493	23,661	825	229	45,831
Tayside	19,391	64,907	54,386	89,996	2,284	3	230,966
No region	24	320	501	1,159	306	591	2,900
Grand Total	85,483	869,972	620,548	1,046,622	41,082	3,148	2,666,856

3.2. Phase 3 Stocking Rates

Figure 2. shows an overall map of the stocking rates for the Phase 3 land (with rates defined in shades of red) and the Phase 3 land where no SR mapping was available (blue).

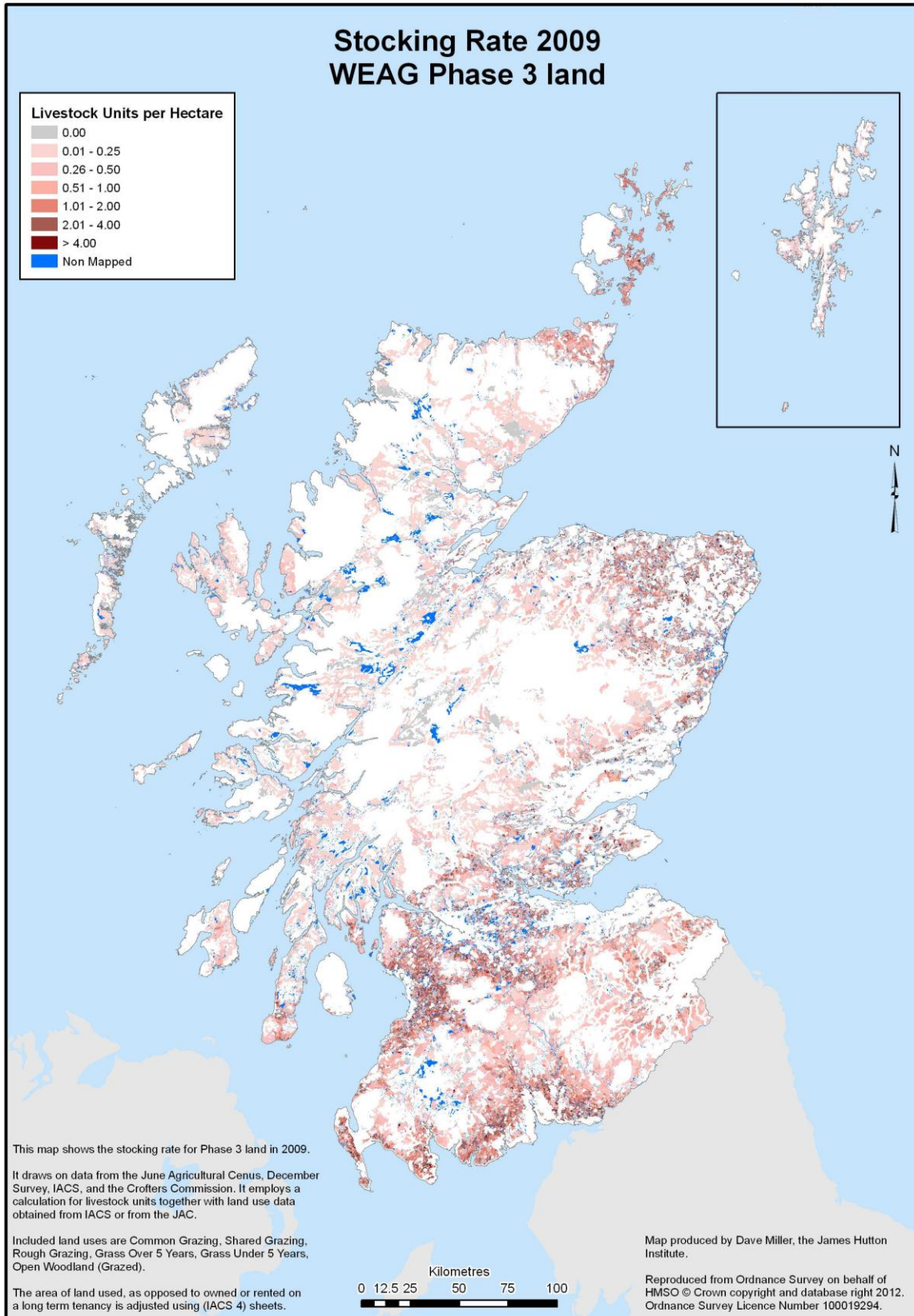


Figure 2: Stocking rates on WEAG Phase 3 land

3.3. Area Weighted Average Stocking Rates

The area weighted average stocking rates for each of the LCA groupings cross tabulated by AgRegion is shown in Table 3.

Table 3: Area weighted average stocking densities in Phase 3 forage land

Weighted Average SR AgRegion	LCA Group					
	Arable	Mixed	Improved	Rough	Other	All LCA
Argyll & Bute	1.06	0.68	0.32	0.14	0.08	0.24
Ayrshire	1.09	1.18	0.70	0.35	0.31	0.95
Clyde Valley	0.97	0.91	0.50	0.25	0.23	0.67
Dumfries & Galloway	1.39	1.19	0.78	0.38	0.38	0.84
East Central	0.67	0.66	0.37	0.18	0.16	0.42
Eileanan an Iar		0.14	0.13	0.08	0.05	0.09
Fife	0.51	0.79	1.19	0.80	0.25	0.71
Highland	0.36	0.49	0.15	0.08	0.07	0.15
Lothian	0.51	0.70	0.45	0.31	0.21	0.52
North East Scotland	0.67	0.81	0.39	0.21	0.18	0.68
Orkney		0.94	0.85	0.56	0.19	0.90
Scottish Borders	0.73	0.76	0.54	0.28	0.17	0.56
Shetland		0.21	0.20	0.17	0.05	0.18
Tayside	0.32	0.59	0.30	0.15	0.07	0.32
No Region	0.05	0.03	0.01	0.03	0.01	0.07
All Regions	0.65	0.84	0.42	0.16	0.18	0.46

These values are broadly similar to those in the previous report for the Mixed, Improved and most of the instances of the Rough LCA class groupings (the differences are tabulated in Table 4). The largest positive difference is in Orkney for LCA-Rough at +0.22 Isu/ha. This perhaps reflects, in Phase 3 land, the elimination of very lightly stocked land in conservation designated areas.

Table 4

Difference (Phase 3 – All) AgRegion	LCA Group					
	Arable	Mixed	Improved	Rough	Other	All LCA
Argyll & Bute	-0.70	0.00	0.03	0.00	-0.15	0.03
Ayrshire	-0.40	-0.10	0.09	-0.02	-0.49	0.08
Clyde Valley	-0.27	-0.16	0.00	0.01	-0.57	-0.04
Dumfries & Galloway	-0.56	-0.22	0.01	0.04	-0.59	-0.02
East Central	-0.93	-0.14	0.05	0.02	-0.47	0.04
Eileanan an Iar		-0.04	-0.01	-0.01	-0.03	0.00
Fife	-0.72	-0.41	-0.03	-0.17	-0.50	-0.48
Highland	-0.44	-0.05	0.01	0.00	-0.03	0.02
Lothian	-0.45	-0.21	-0.08	-0.01	-0.33	-0.22
North East Scotland	-1.03	-0.39	0.02	0.07	-0.41	-0.08
Orkney		-0.17	0.01	0.22	-0.53	0.06
Scottish Borders	-0.33	-0.09	0.03	0.06	-0.37	0.00

Shetland		-0.04	-0.02	0.00	-0.16	0.00
Tayside	-1.06	-0.21	0.02	0.01	-0.43	-0.05
No Region	-1.24	-0.80	-0.17	-0.30	-0.23	-0.20
All Regions	-0.64	-0.19	0.04	0.02	-0.16	0.06

3.4. Distribution of Stocking Rates per LCA Grouping

The distribution of stocking rates for each AgRegion is shown in Figure 3 to Figure 16 below. Each figure has four graphs, one per LCA class grouping (Arable, Mixed, Improved and Rough). In each graph the proportion of the LCA grouping for each of the SR ranges is shown. The category SR=NULL indicates those areas within each AgRegion which lie outside the combined mapping of Fields, Holdings, and Commons. This is distinct from SR=0 which indicates areas where we do have mapping but no stock are present.

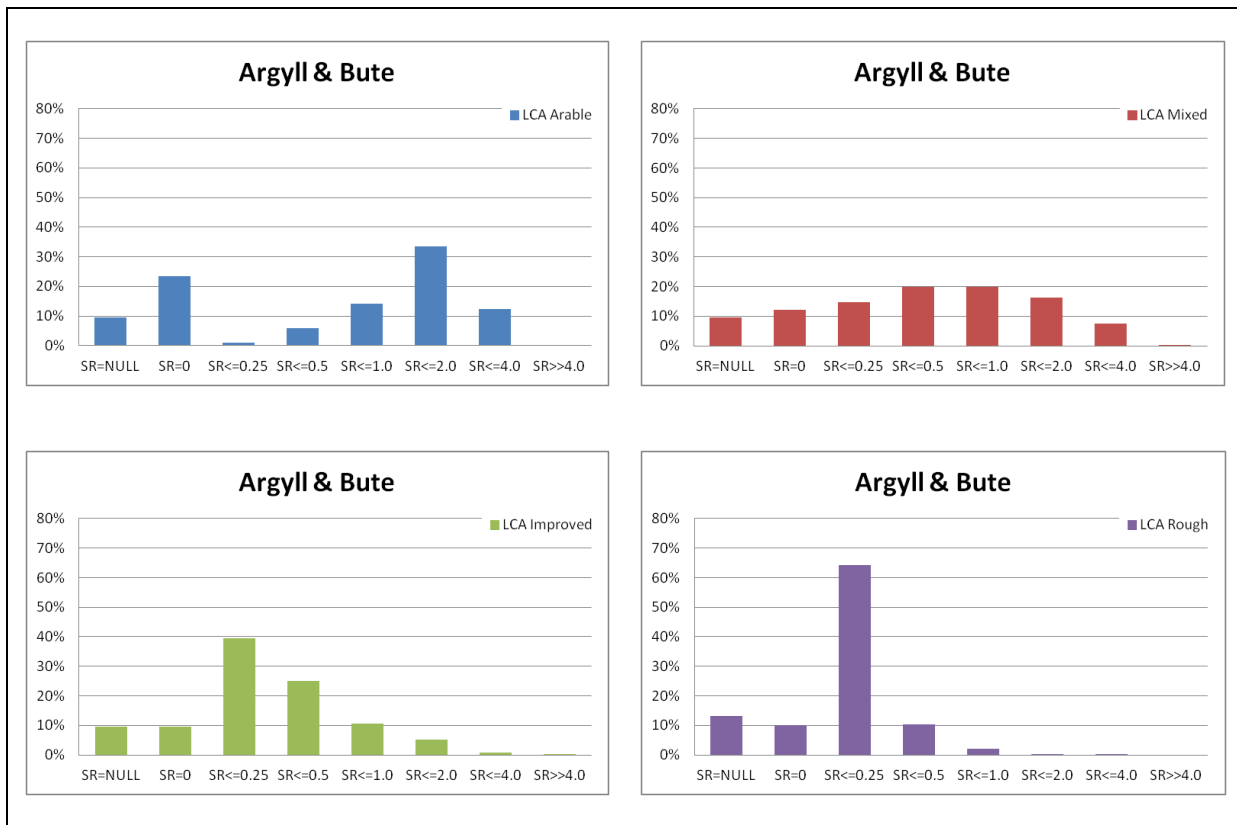


Figure 3: Argyll & Bute stocking rate distribution (Phase 3)

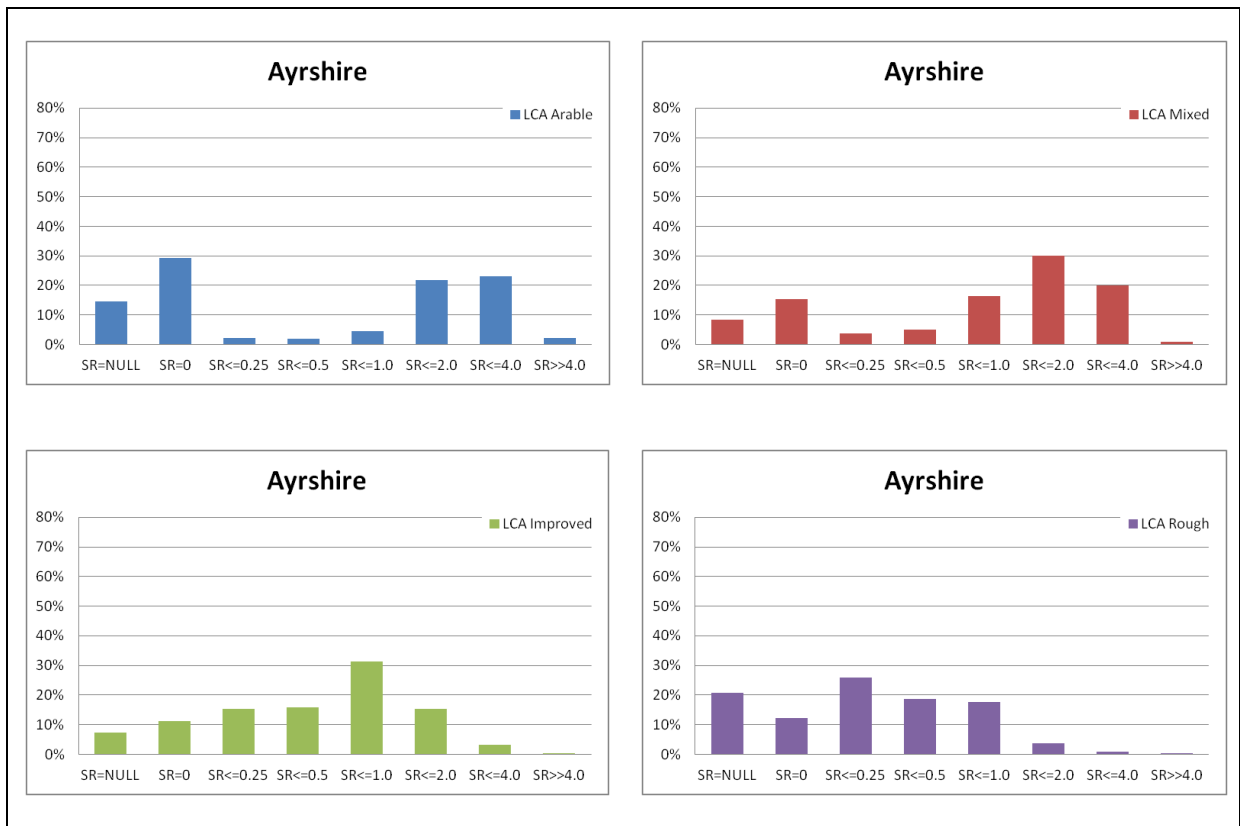


Figure 4: Ayrshire stocking rate distribution (Phase 3)

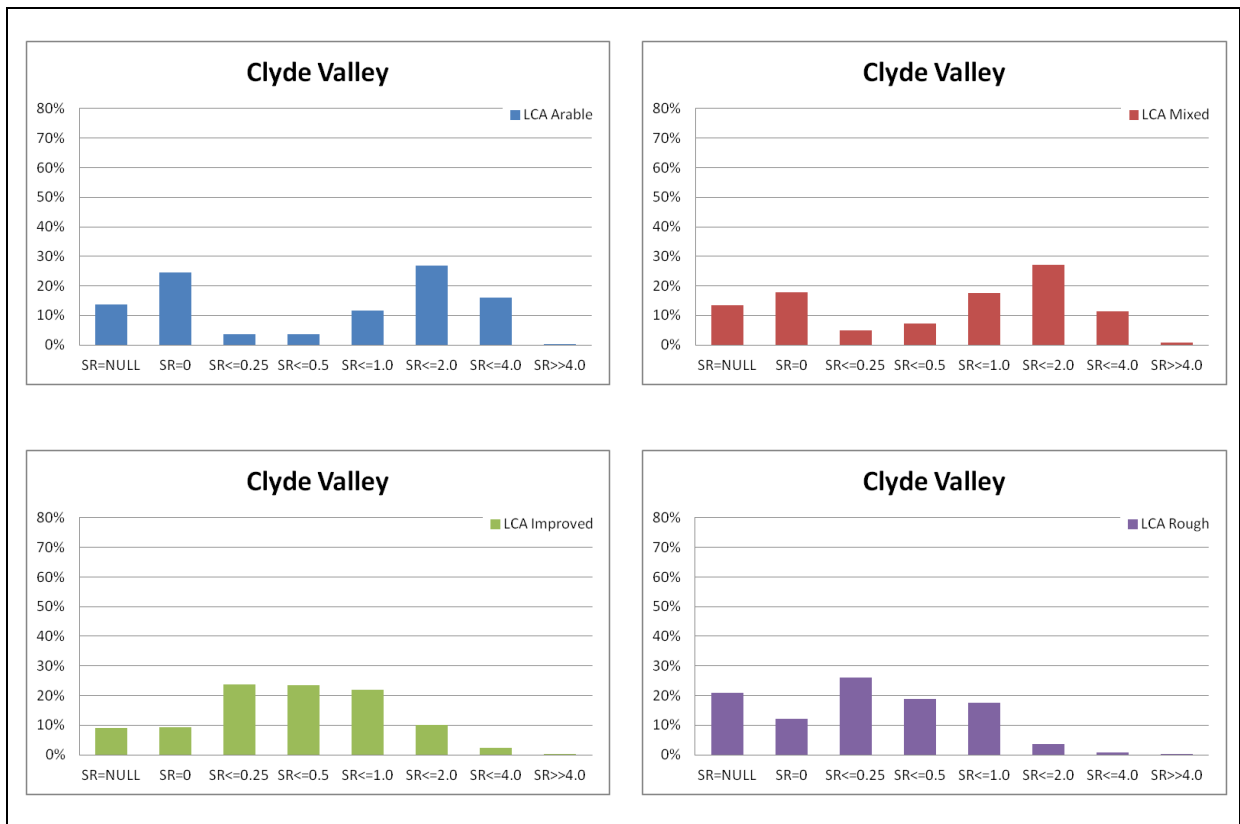


Figure 5: Clyde Valley stocking rate distribution (Phase 3)

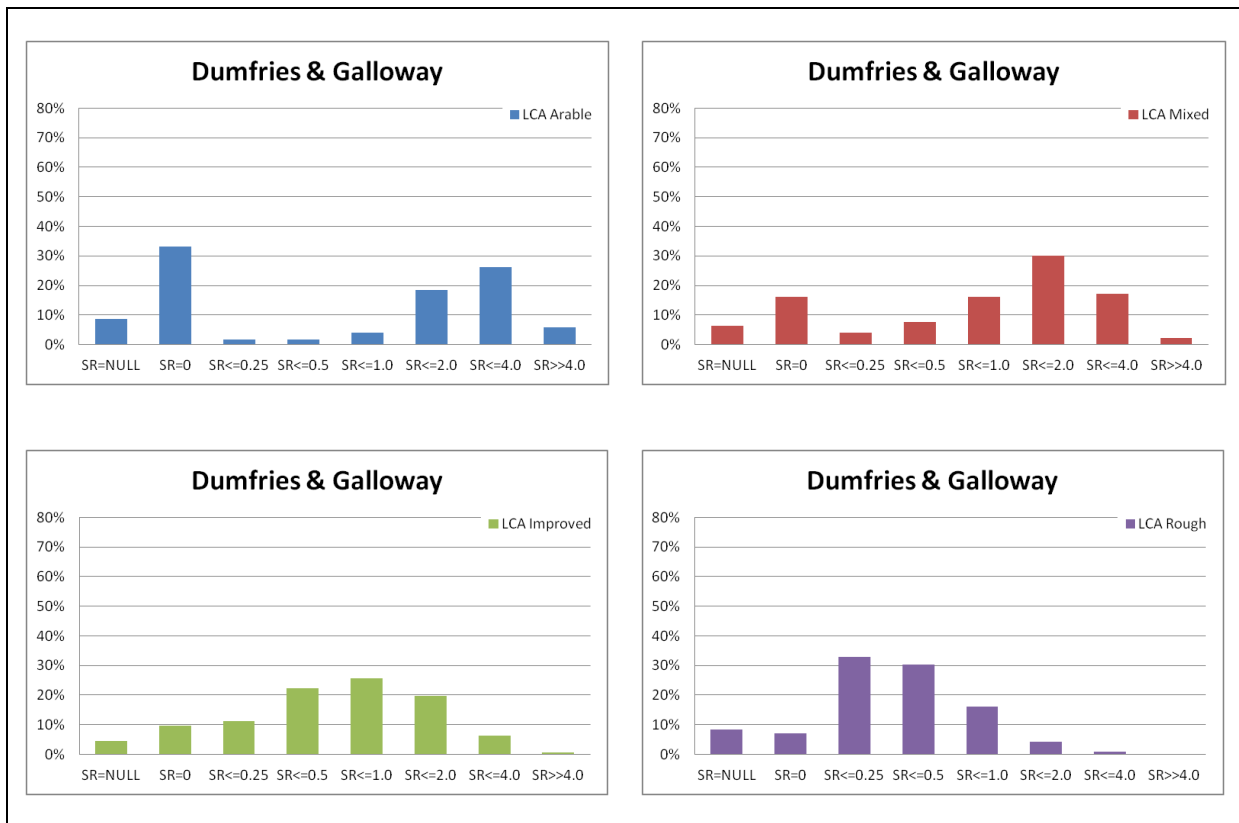


Figure 6: Dumfries & Galloway stocking rate distribution (Phase 3)

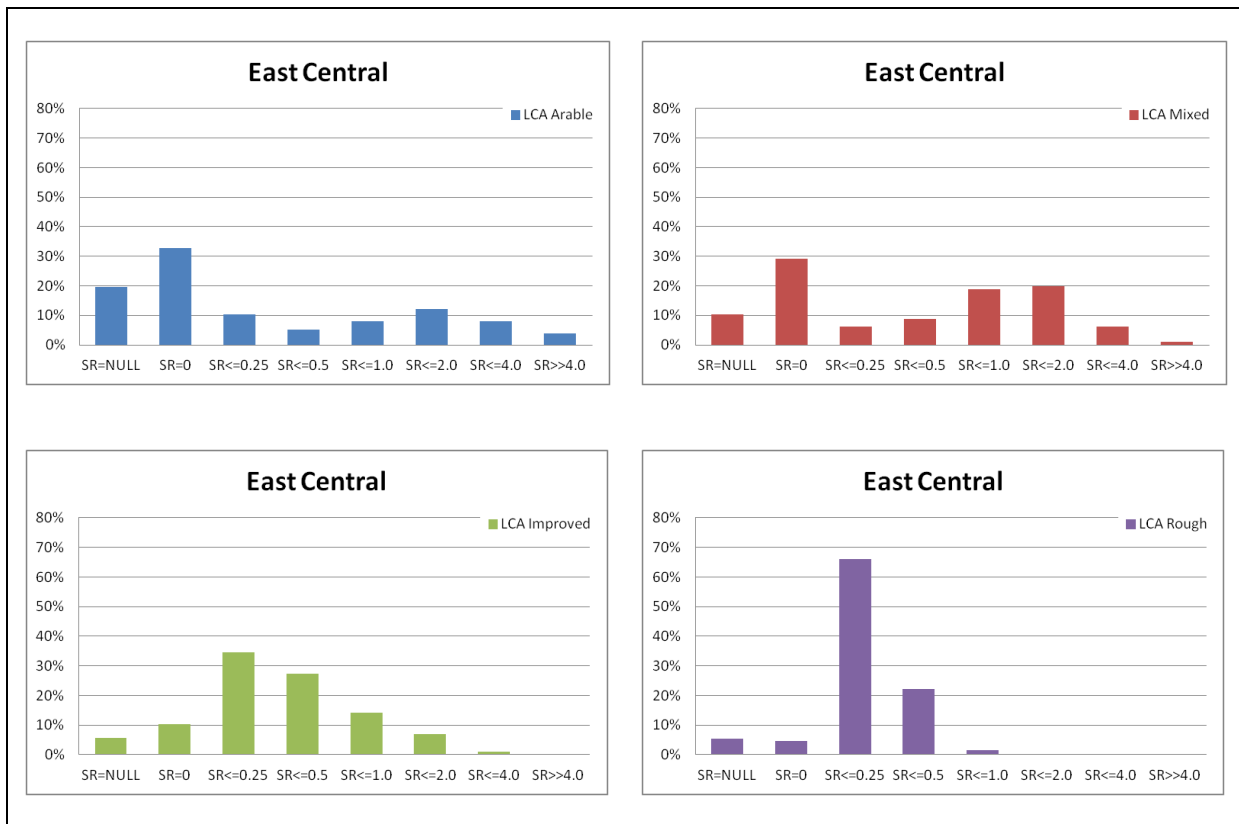


Figure 7: East Central stocking rate distribution (Phase 3)

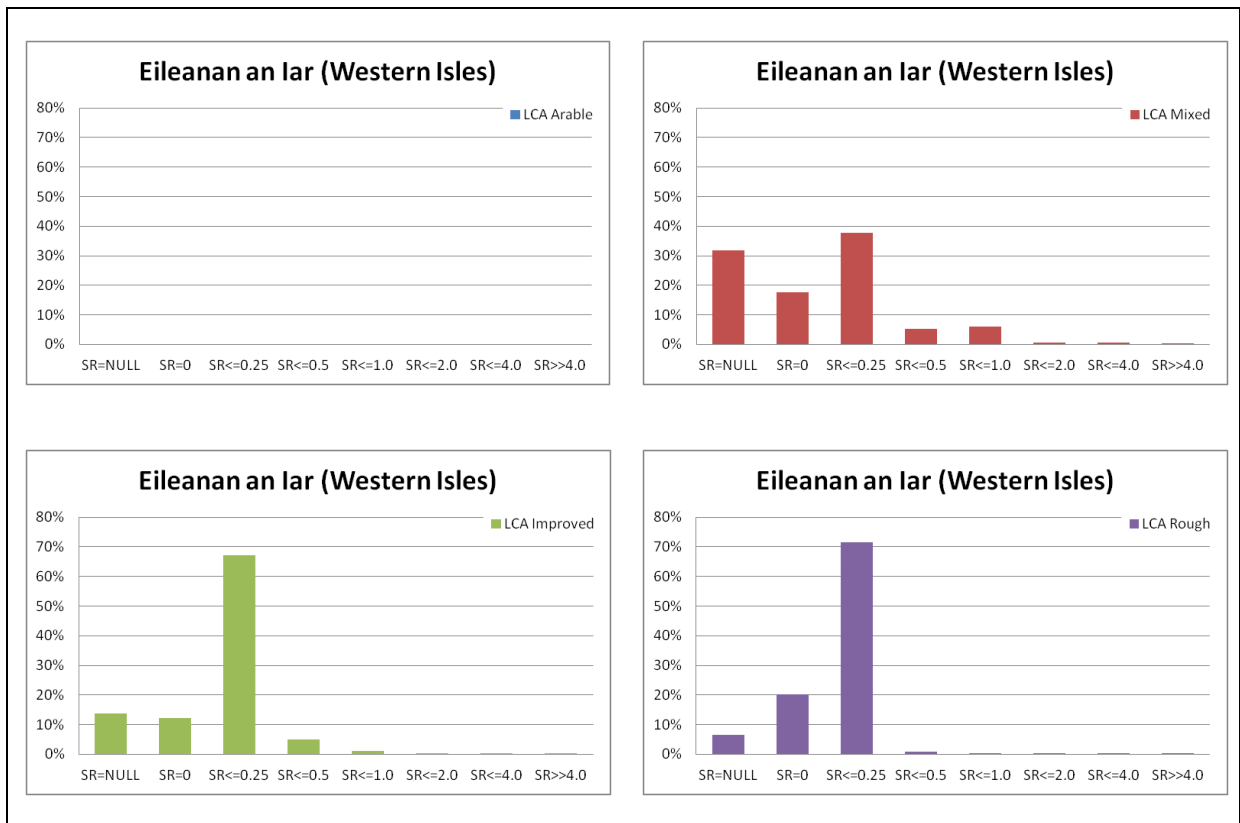


Figure 8: Eileanan an Iar (Western Isles) stocking rate distribution (Phase 3)



Figure 9: Fife stocking rate distribution (Phase 3)

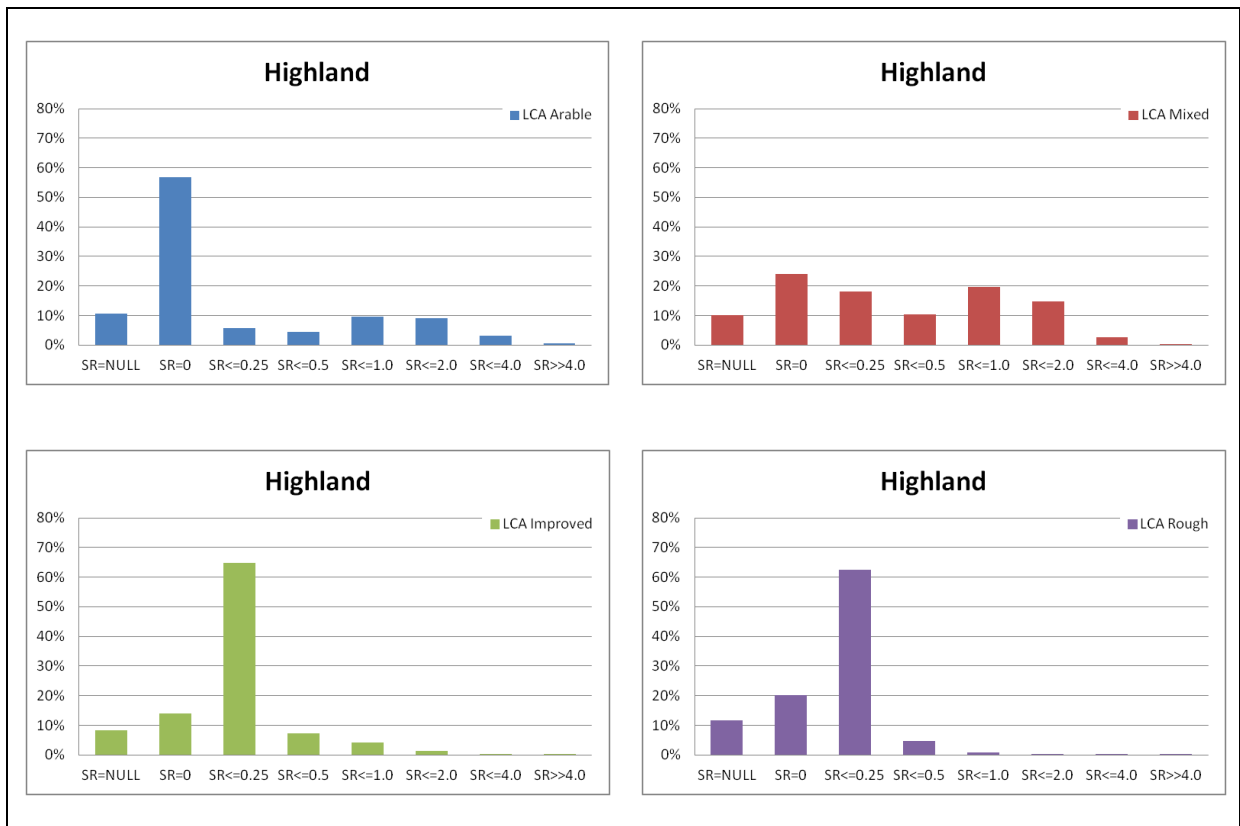


Figure 10: Highland stocking rate distribution (Phase 3)

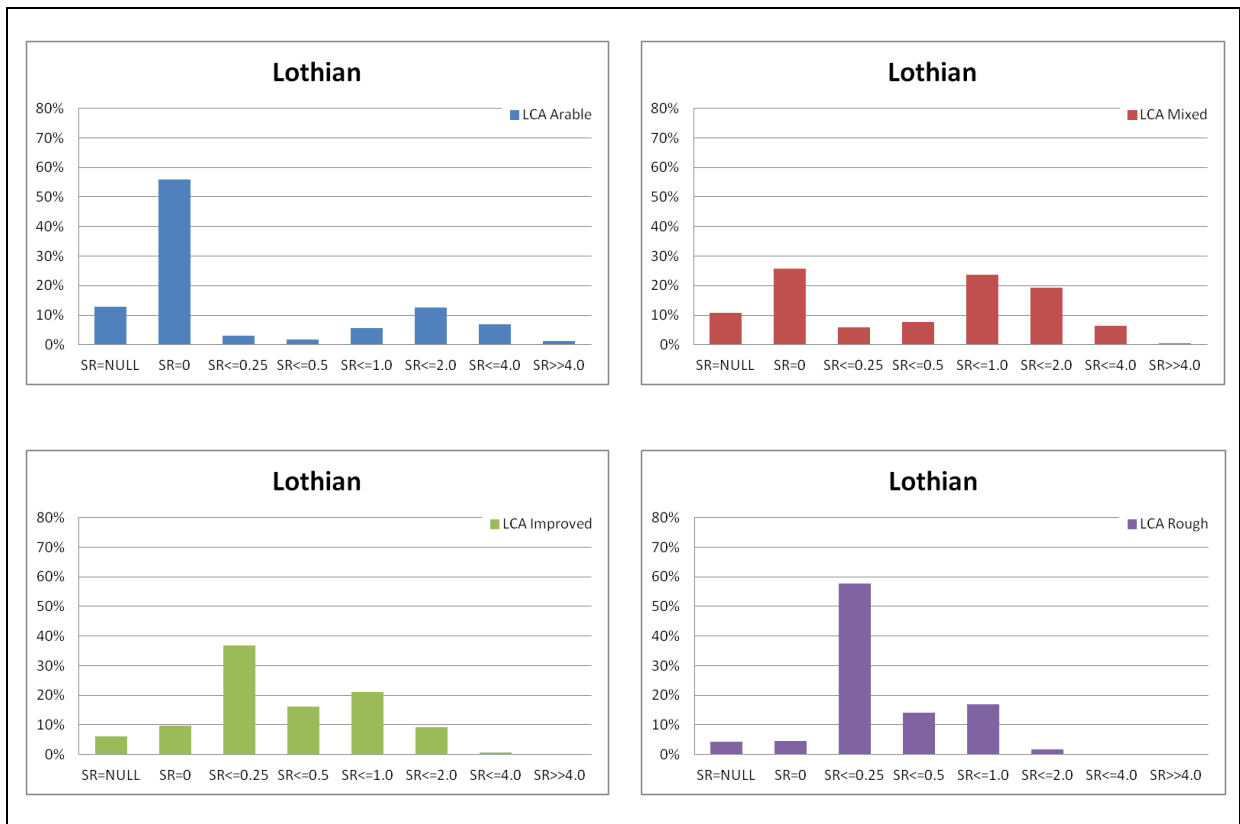


Figure 11: Lothian stocking rate distribution (Phase 3)

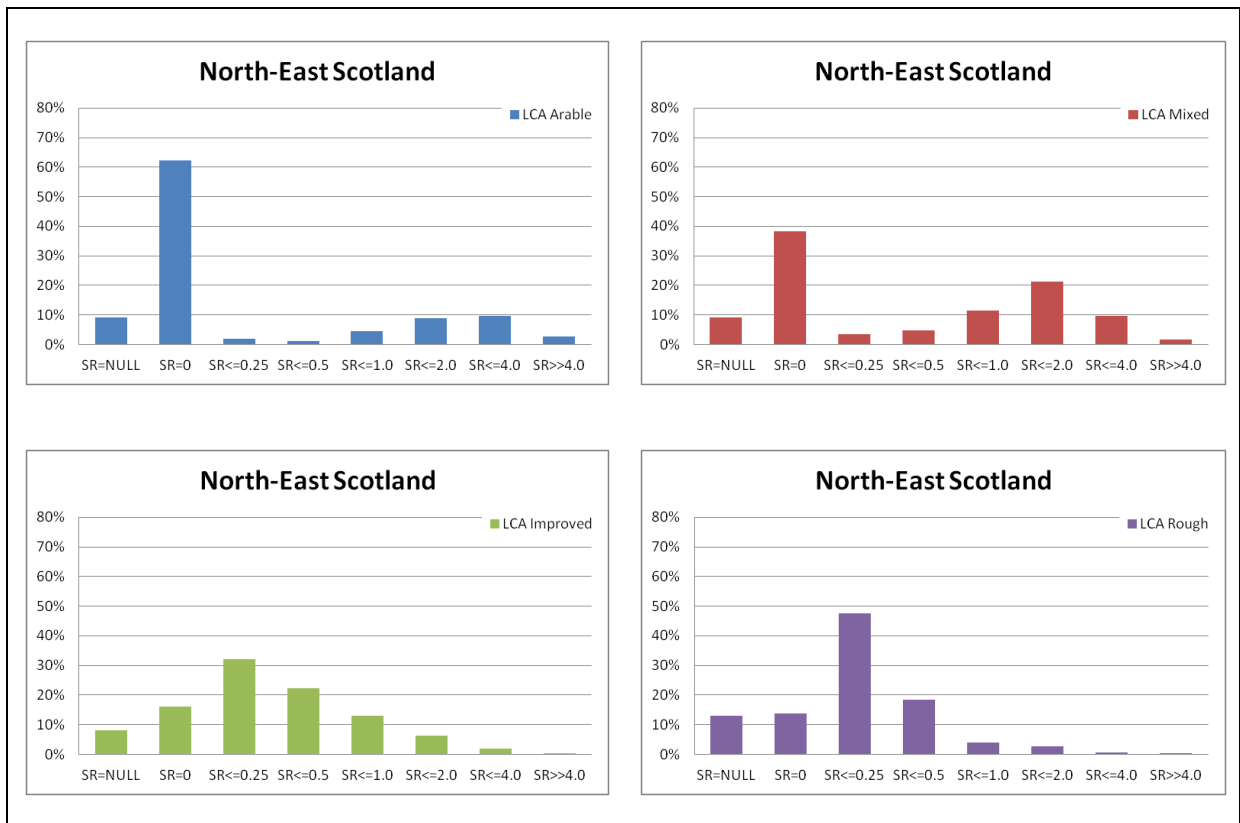


Figure 12: North-East Scotland stocking rate distribution (Phase 3)

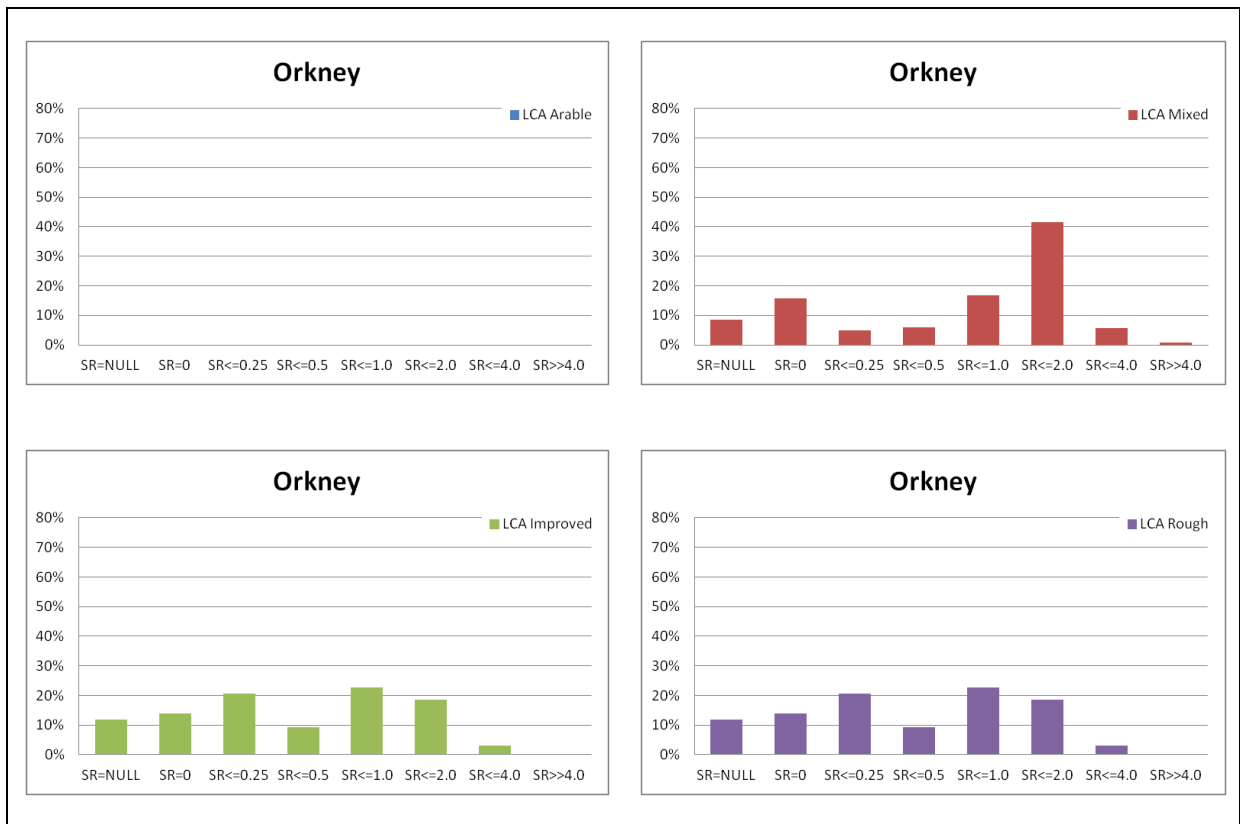


Figure 13: Orkney stocking rate distribution (Phase 3)

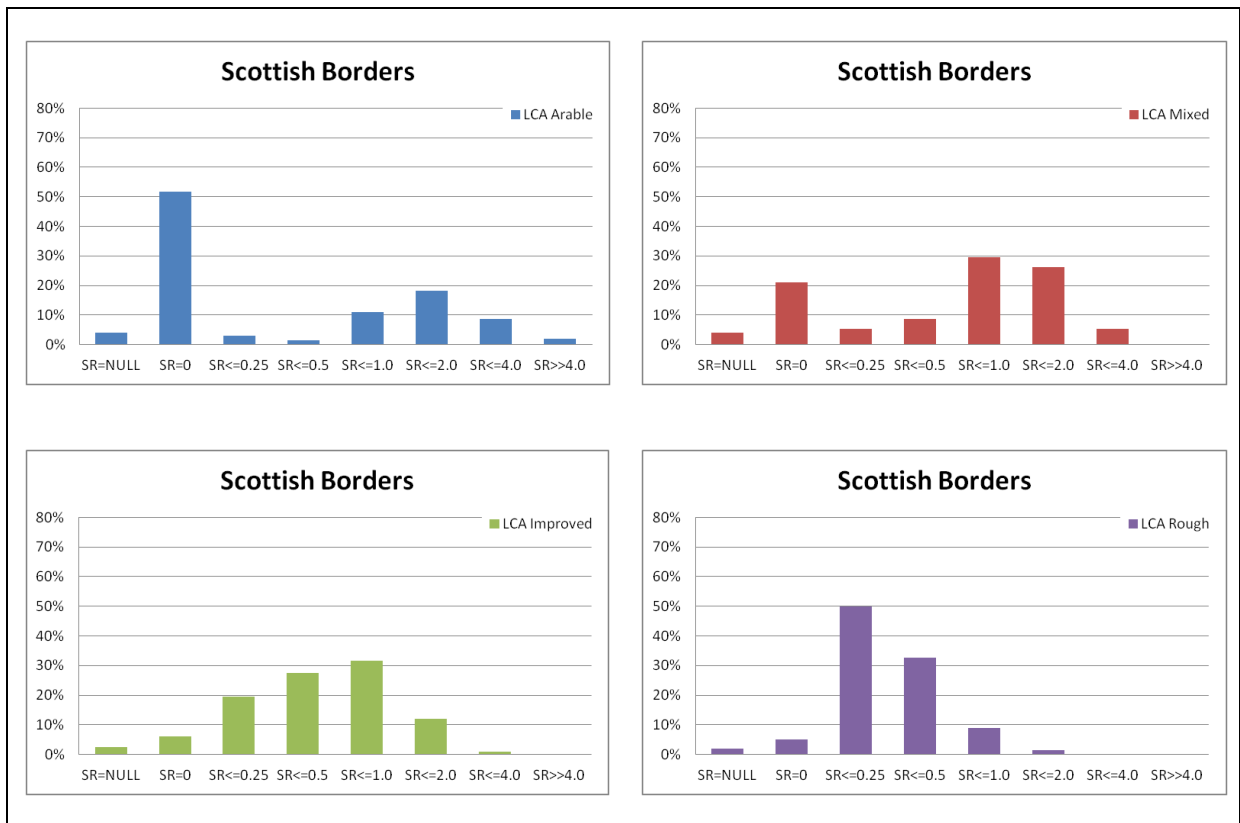


Figure 14: Scottish Borders stocking rate distribution (Phase 3)



Figure 15: Shetland stocking rate distribution (Phase 3)

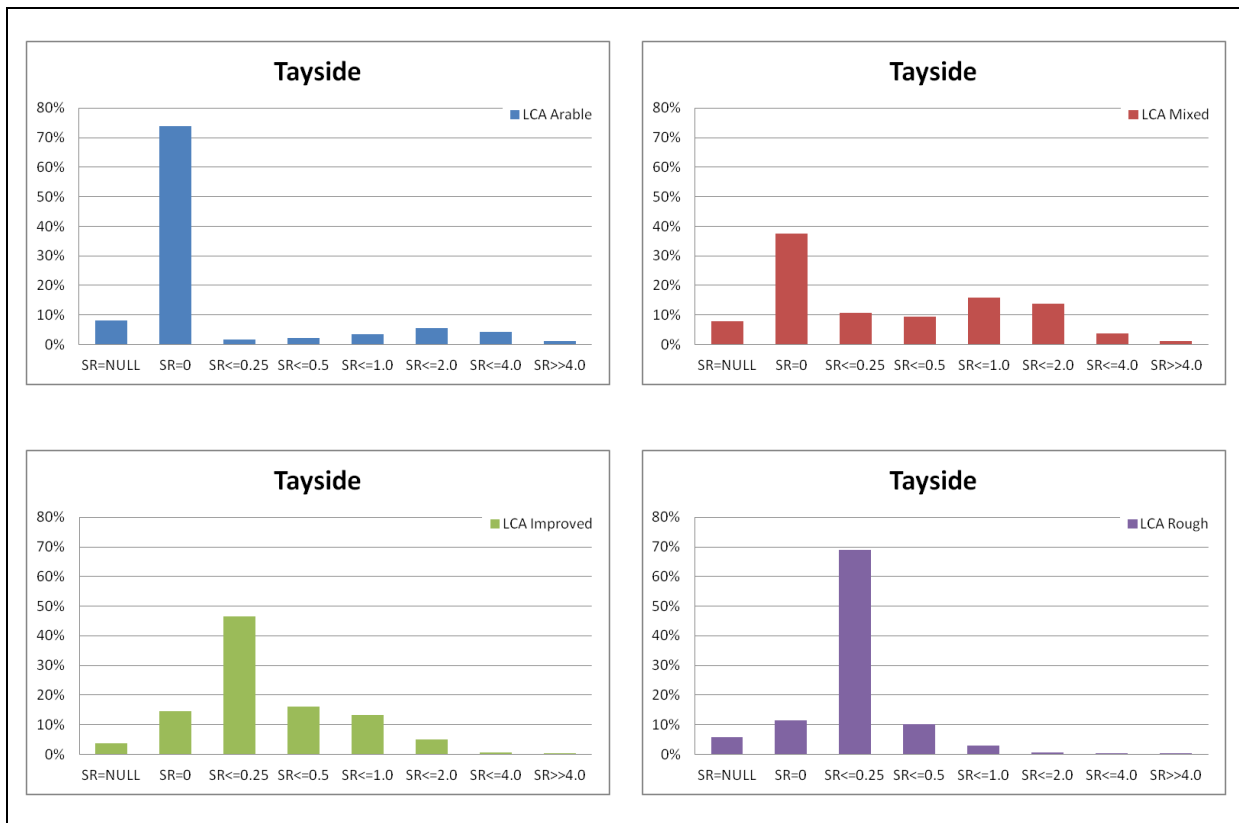


Figure 16: Tayside stocking rate distribution (Phase 3)

3.5. Stocking Rate Mix per Region

The figures in this section illustrate the mix of SRs that occur in each region. Figure 17 to Figure 19 present the overall mix of stocking rates that occur in each region regardless of LCA grouping whilst Figure 20 to Figure 22 show the SR mix for each of the LCA groupings within the regions.

These figures show a broadly similar pattern of SR mixes on Phase 3 land compared with previous analysis which included all agricultural land. A larger relative proportion of the agricultural area of Argyll & Bute and Dumfries & Galloway falls within the Phase 3 area (when compared with the national proportion) while the Western Isles and Tayside have smaller relative proportions.

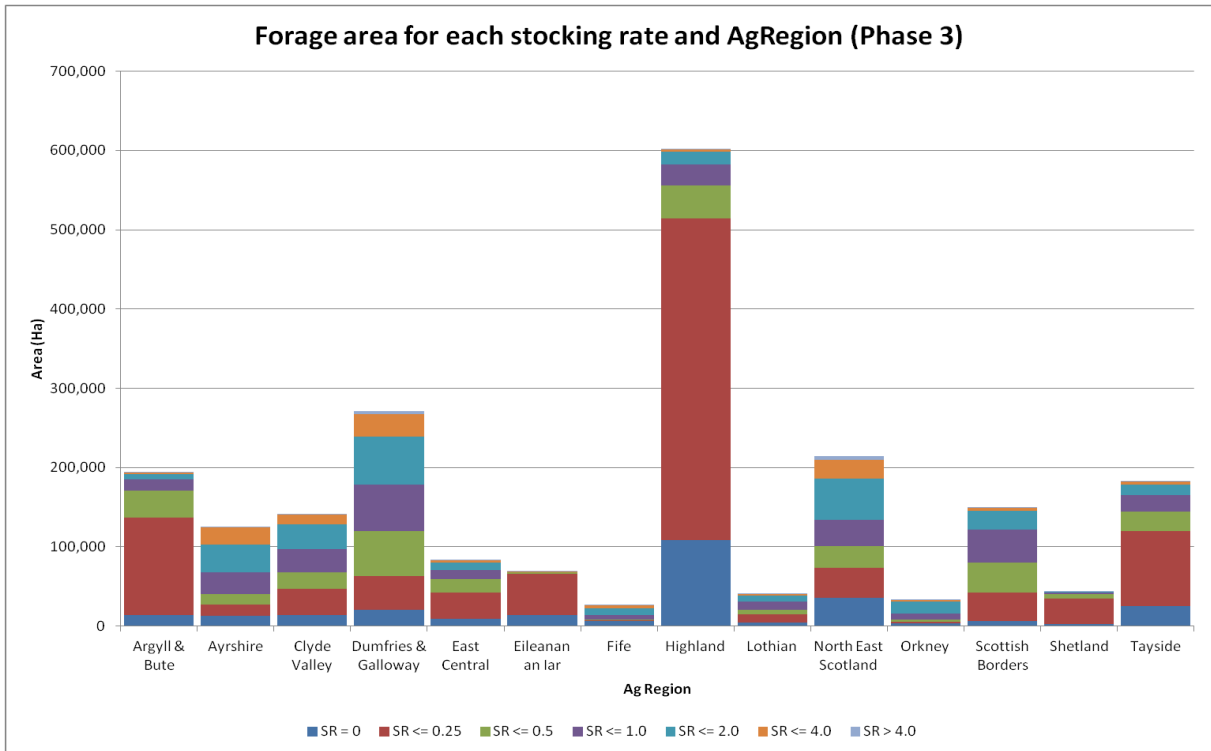


Figure 17

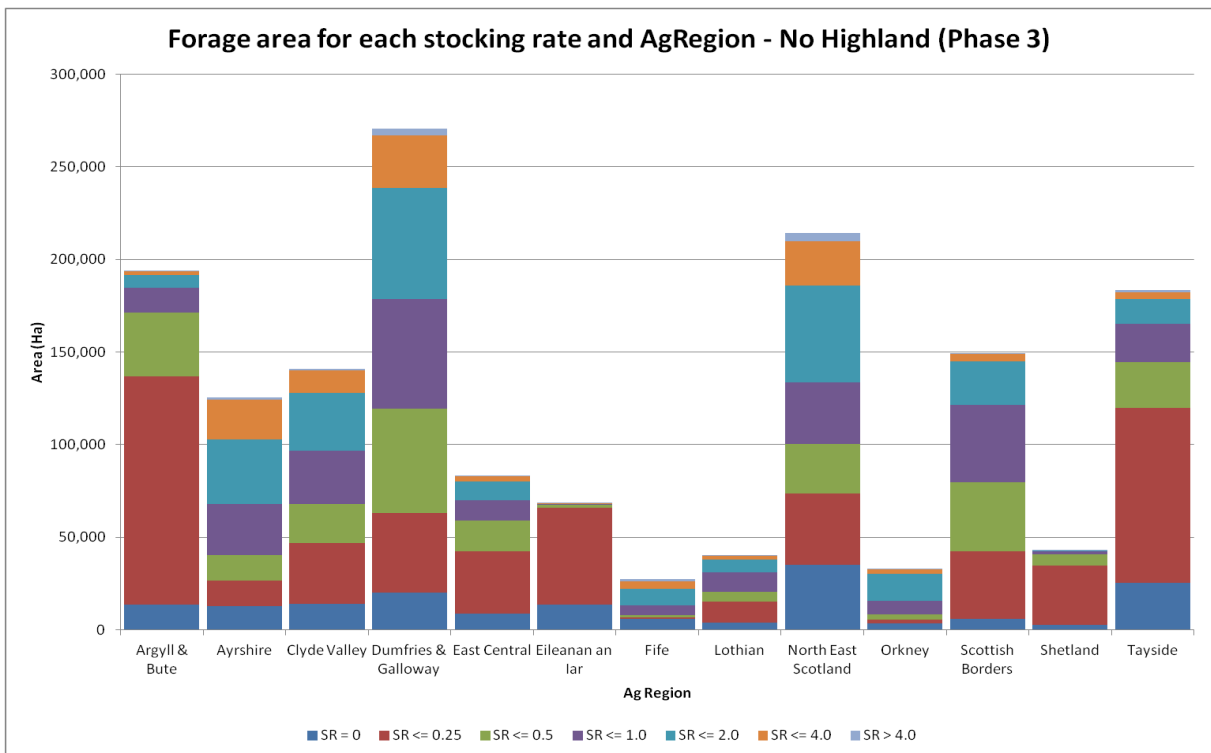


Figure 18

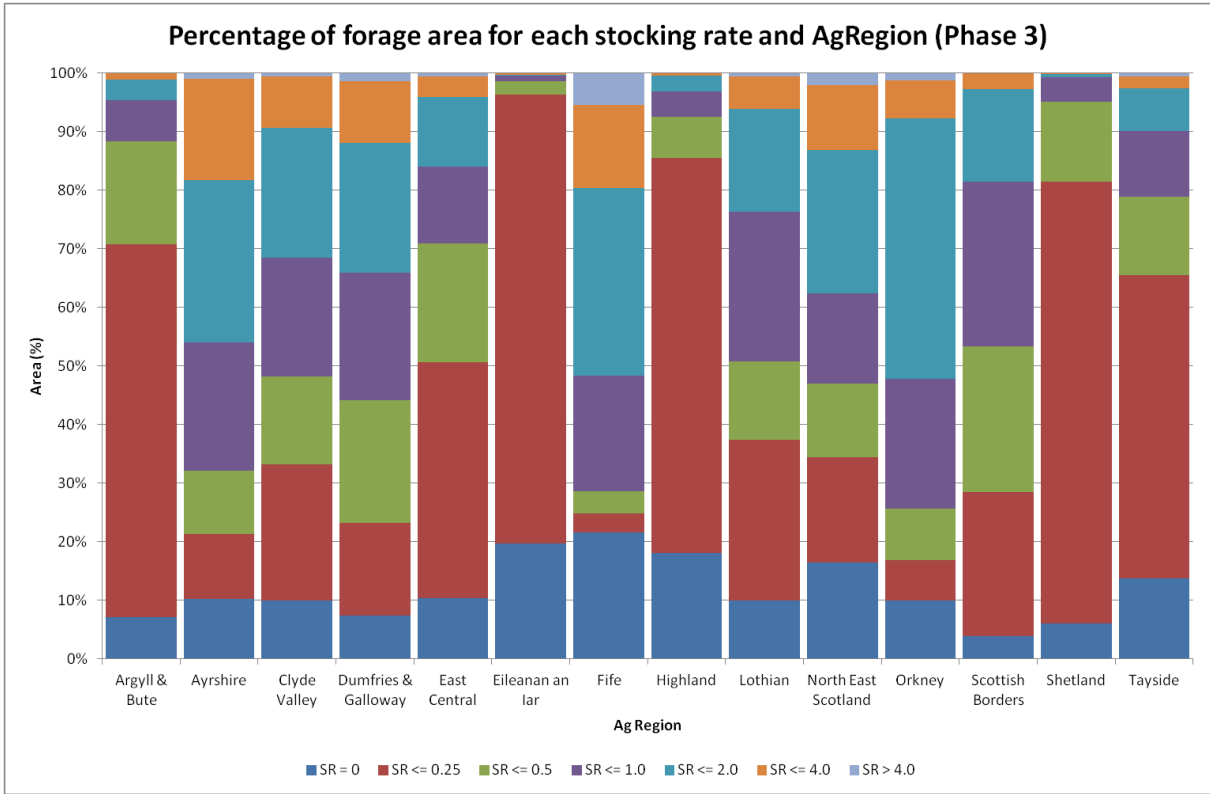


Figure 19

Forage area for each stocking rate by AgRegion and LCA Group (Phase 3)

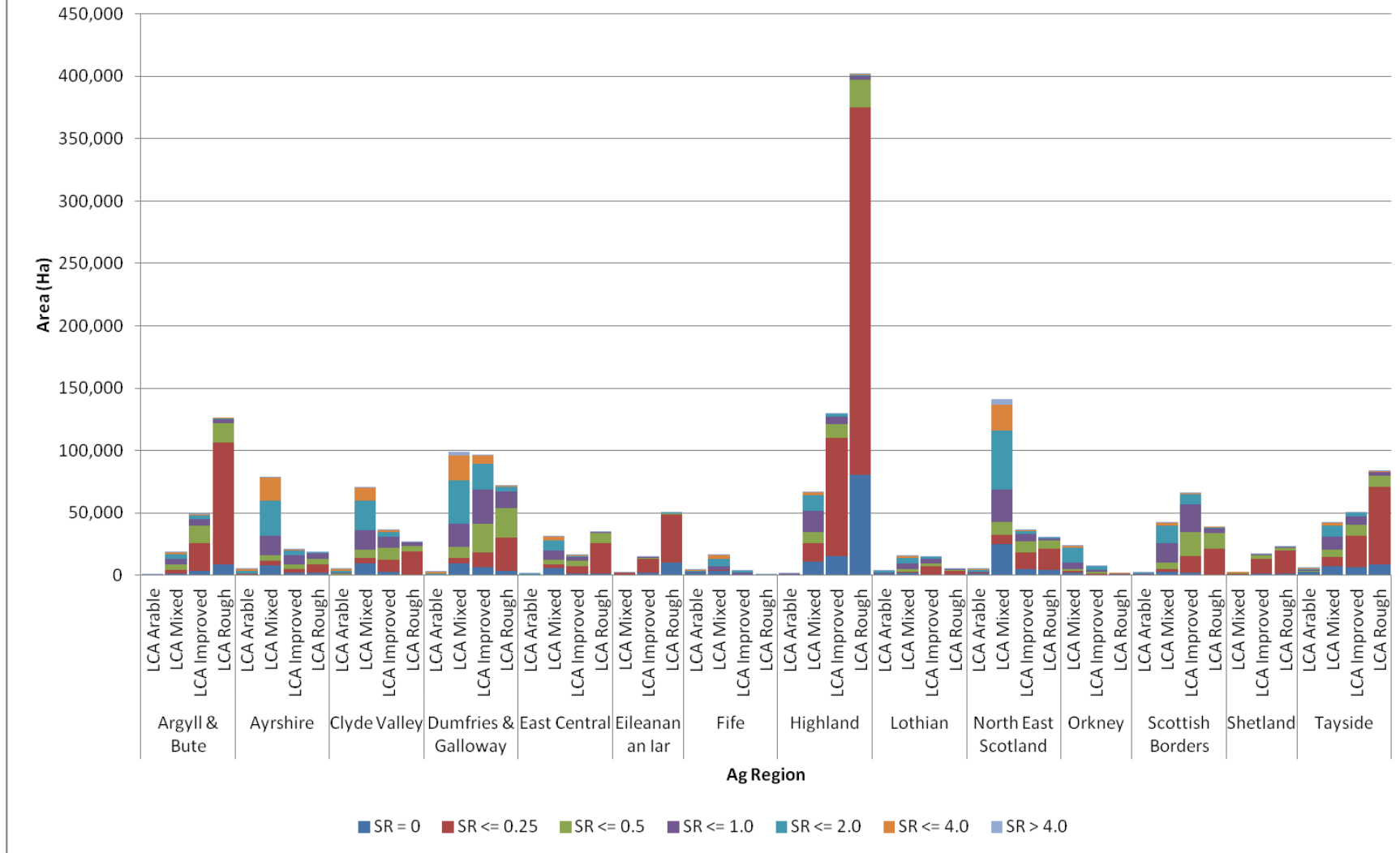


Figure 20

Forage area for each stocking rate by AgRegion and LCA Group - No Highland (Phase 3)

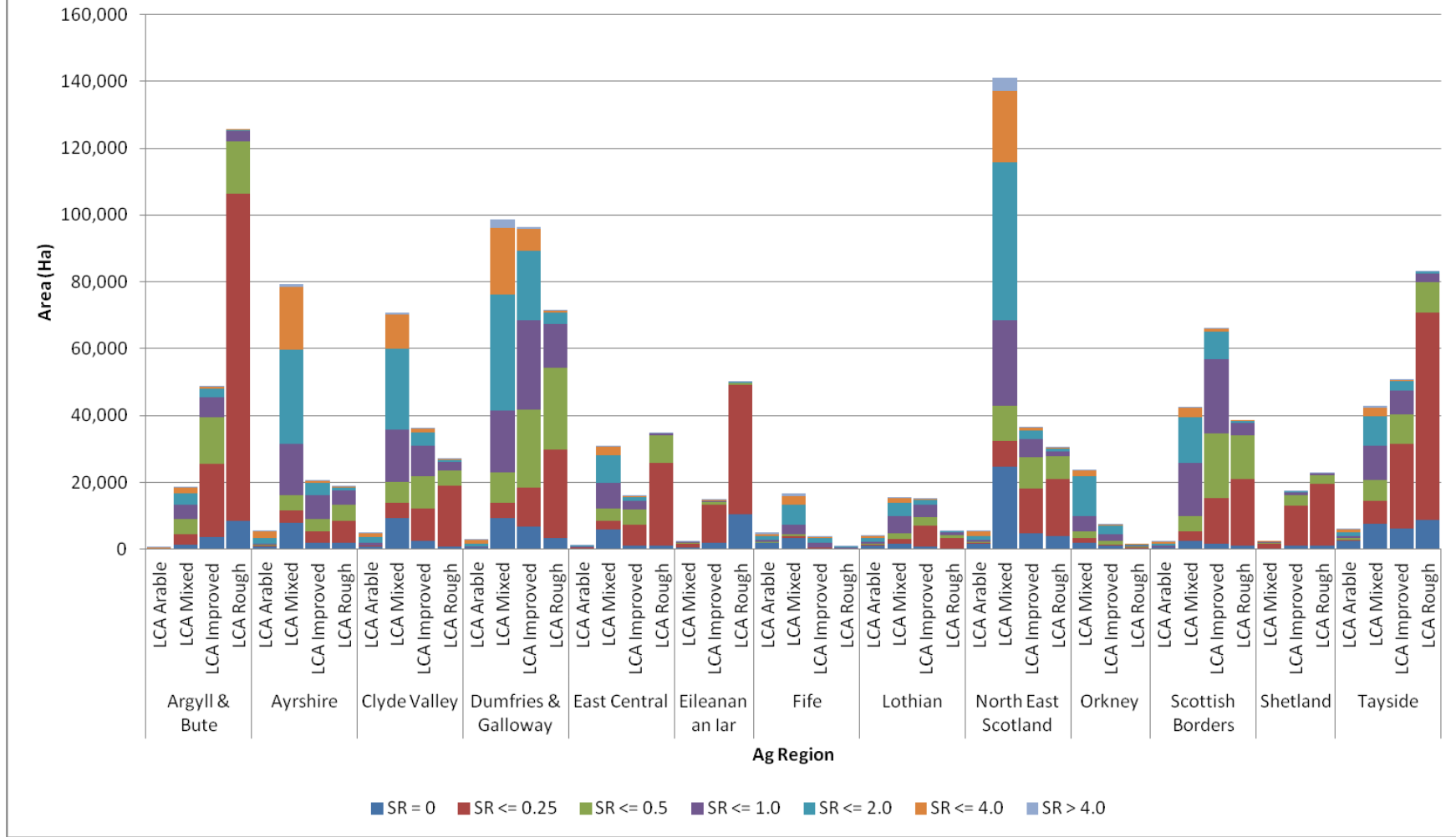


Figure 21

Forage area for lower stocking rates by AgRegion and LCA Group - No Highland (Phase 3)

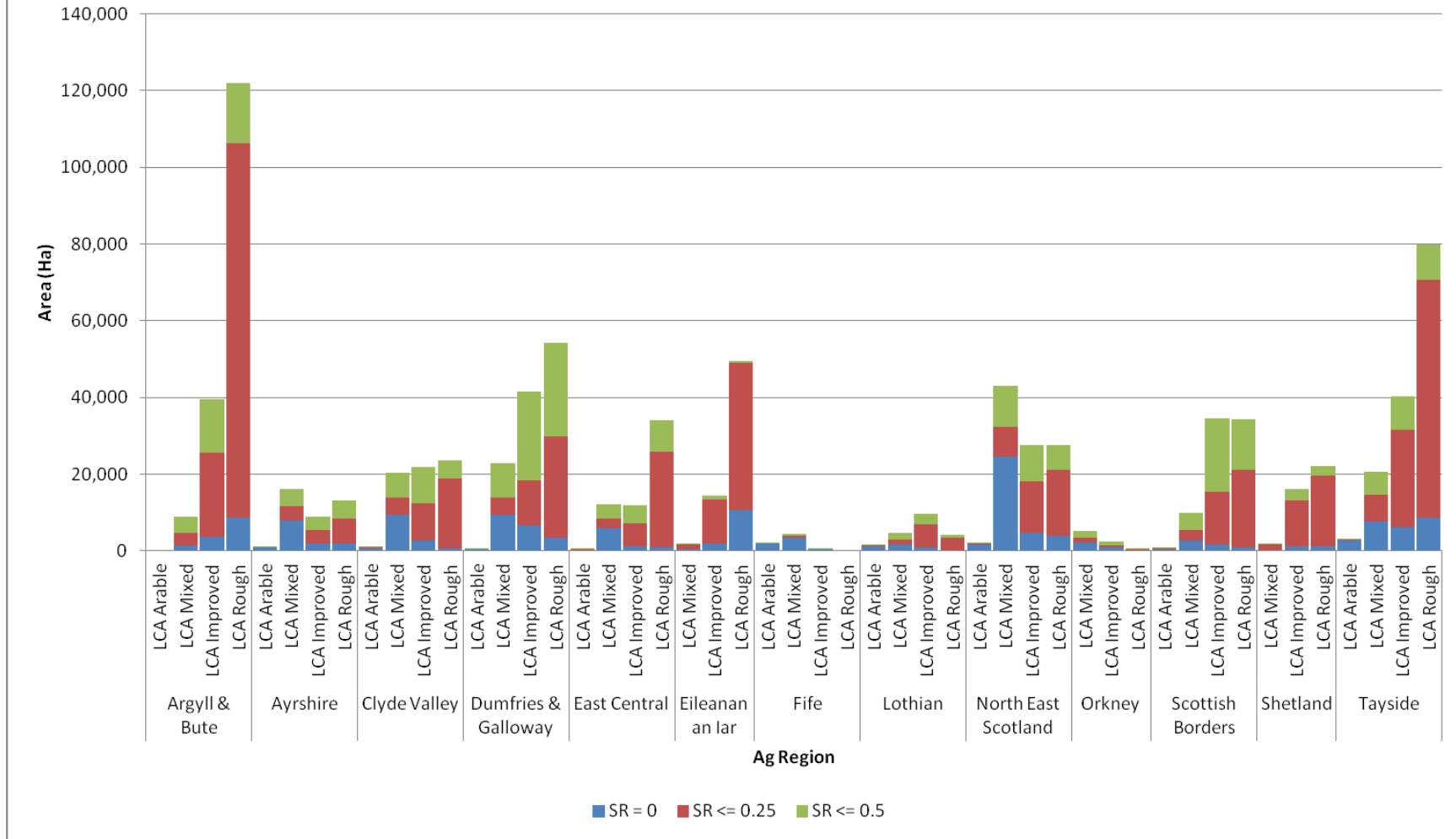


Figure 22

4. SUPPORTING ANALYSES

4.1. LCA Mix per Region (Phase 3)

To provide context for the SR values the mix of LCA groupings for each AgRegion is presented for the mapped (Figure 23), forage (Figure 24), stocked (Figure 25), and unstocked (Figure 26) areas of Phase 3 land. The values are cross-tabulated in Section 5 (Supporting Tabular Data). The intention of deriving these figures is to indicate the absolute (Ha) and relative (%) magnitude of the areas associated with each of the LCA groupings for each of the regions. The pairs of illustrations have previously been shown to be useful given the diversity in the range of AgRegion sizes. As above using magnitudes alone for issues related to the LCA rough class means that Highland region tends to dominate and obscure the potential of other regions.

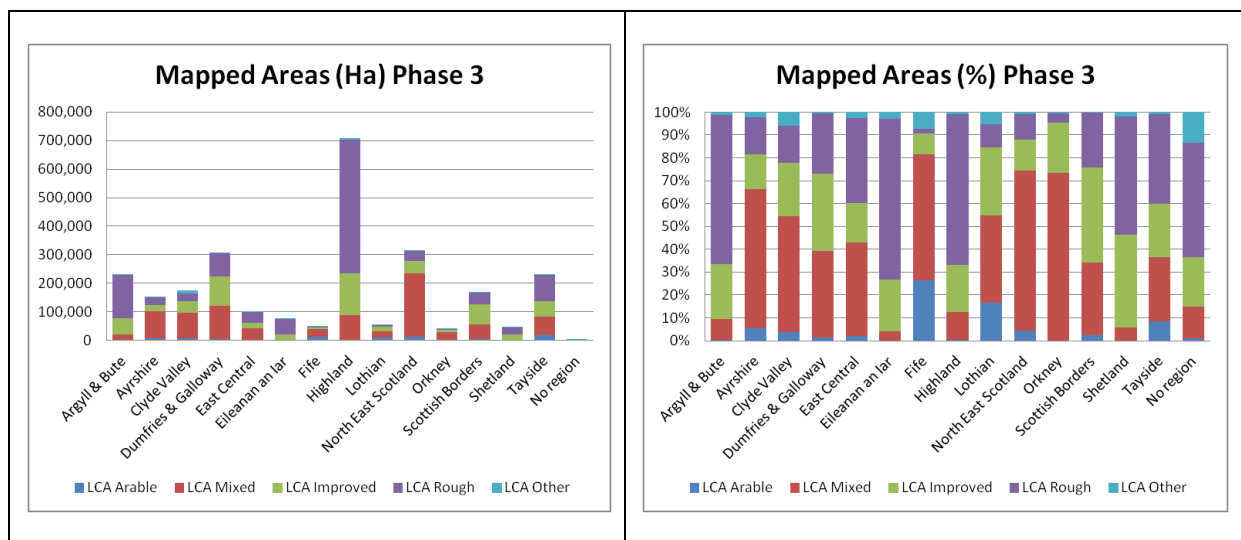


Figure 23

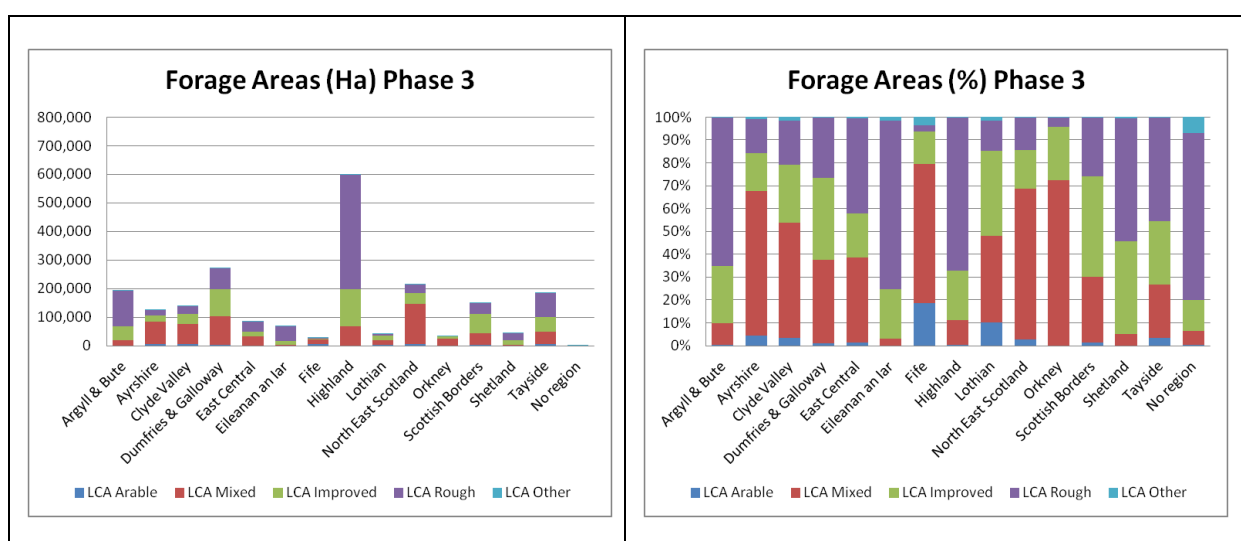


Figure 24

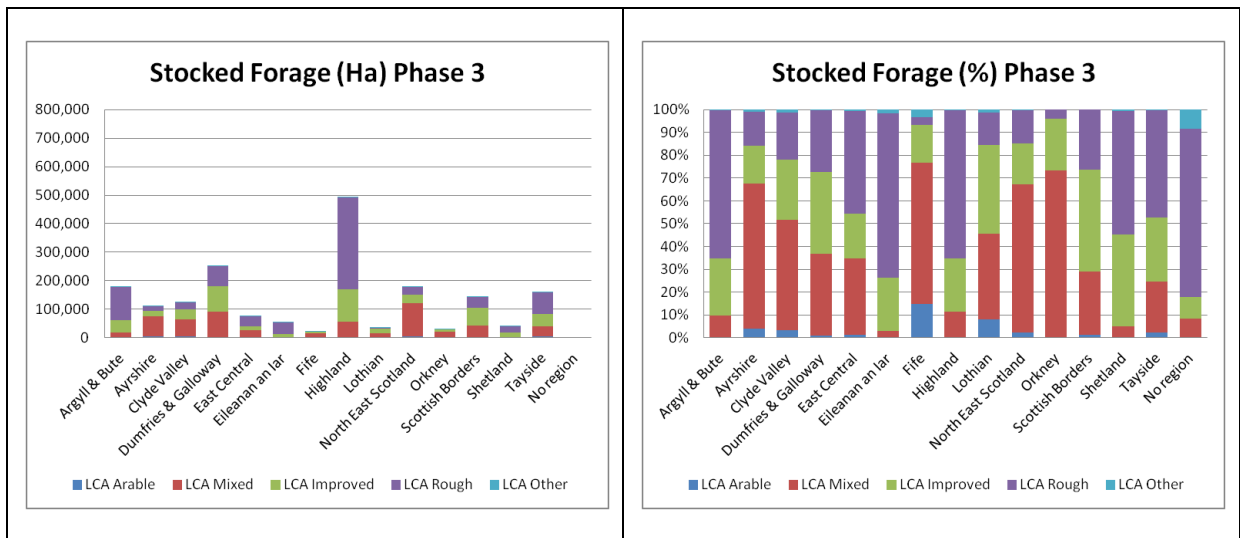


Figure 25

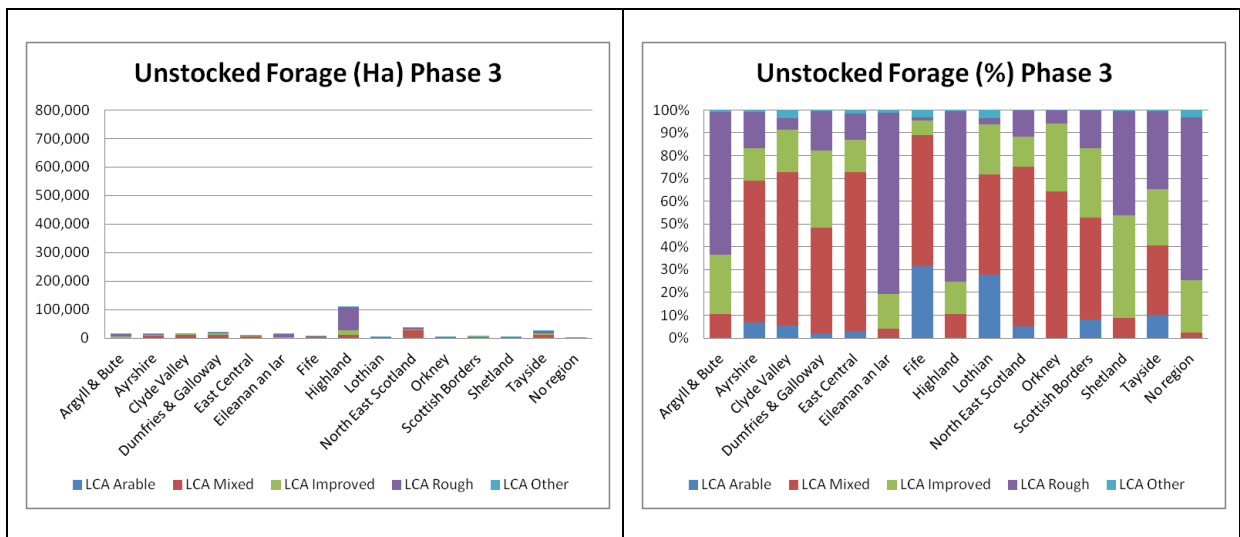


Figure 26

4.2. Forage Area Characteristics (Phase 3)

Table 5 presents the forage area (in hectares) in Phase 3 land for each of the LCA groupings cross-tabulated with AgRegion. The table has been shaded to highlight those regions with large areas of particular LCA groupings (dark green for the 75th percentile of area shading to brown for the 25th percentile).

Table 5: Forage area per AgRegion and LCA Grouping

Forage Area (Ha)	LCA Grouping					All LCA
	Arable	Mixed	Improved	Rough	Other	
Argyll & Bute	413	18,496	48,631	125,367	626	193,714
Ayrshire	5,578	79,431	20,645	18,761	1,194	125,615
Clyde Valley	4,851	70,828	36,021	26,888	2,354	140,943
Dumfries & Galloway	3,125	98,754	96,529	71,628	663	270,726
East Central	1,259	30,994	15,885	34,765	482	83,386
Eileanan an Iar		2,167	14,657	49,952	1,067	68,287
Fife	5,077	16,724	3,917	791	938	27,449
Highland	1,433	66,599	129,448	401,413	1,884	601,086
Lothian	4,040	15,403	15,011	5,286	650	40,391
North East Scotland	5,787	141,017	36,605	30,337	359	214,120
Orkney		23,857	7,632	1,392	25	32,974
Scottish Borders	2,193	42,495	65,892	38,468	71	149,131
Shetland		2,221	17,294	22,833	253	42,730
Tayside	6,115	43,040	50,622	83,200	311	183,288
No Region	1	20	43	238	22	902
All Regions	39,872	652,048	558,834	911,319	10,899	2,174,742

Table 6 presents the same data but with the forage area as the percentage of the total mapped agricultural area in Phase 3 land.

Table 6: Forage area as % of total agricultural area in Phase 3 per AgRegion and LCA Grouping

Forage as % of mapped	LCA Grouping					All LCA
	Arable	Mixed	Improved	Rough	Other	
Argyll & Bute	75%	85%	87%	82%	25%	83%
Ayrshire	67%	85%	89%	75%	34%	82%
Clyde Valley	73%	79%	88%	95%	23%	80%
Dumfries & Galloway	67%	86%	93%	89%	32%	88%
East Central	61%	75%	91%	93%	19%	83%
Eileanan an Iar		68%	86%	93%	51%	89%
Fife	38%	61%	83%	73%	26%	54%
Highland	47%	79%	88%	85%	35%	85%
Lothian	43%	72%	89%	93%	22%	72%
North East Scotland	41%	64%	87%	84%	16%	68%
Orkney		83%	88%	86%	18%	84%
Scottish Borders	56%	80%	94%	95%	33%	89%
Shetland		85%	94%	96%	31%	93%
Tayside	32%	66%	93%	92%	14%	79%
No Region	4%	6%	9%	21%	7%	31%
All Regions	47%	75%	90%	87%	27%	82%

5. SUPPORTING TABULAR DATA

5.1. Phase 3 Areas – Mapped, Forage, Stocked and Unstocked

Table 7: Total mapped area (ha) in Phase 3 land per AgRegion and LCA Grouping

Mapped Area (Ha) AgRegion	LCA Grouping					All LCA
	Arable	Mixed	Improved	Rough	Other	
Argyll & Bute	497	19,744	50,329	132,042	675	203,287
Ayrshire	7,135	85,854	21,389	19,797	1,268	135,444
Clyde Valley	5,745	77,331	37,169	27,710	2,626	150,581
Dumfries & Galloway	4,258	108,095	99,726	73,783	712	286,574
East Central	1,658	37,044	16,464	35,502	558	91,227
Eileanan an Iar	-	2,176	14,703	50,220	1,071	68,171
Fife	11,922	24,537	4,334	857	1,300	42,952
Highland	2,704	76,189	134,264	415,277	1,987	630,420
Lothian	8,177	19,214	15,736	5,448	906	49,480
North East Scotland	12,794	201,351	38,611	31,358	584	284,698
Orkney	-	26,281	8,010	1,424	29	35,744
Scottish Borders	3,745	51,133	68,393	39,487	88	162,846
Shetland	-	2,251	17,369	22,861	254	42,735
Tayside	17,836	59,742	52,311	84,861	543	215,293
No Region	1	21	44	245	27	339
All Regions	76,474	790,963	578,854	940,872	12,628	2,399,790

Table 8: Total forage area (ha) in Phase 3 land per Region and LCA Grouping

Forage Area (Ha) AgRegion	LCA Grouping					All LCA
	Arable	Mixed	Improved	Rough	Other	
Argyll & Bute	413	18,496	48,631	125,367	626	193,533
Ayrshire	5,578	79,431	20,645	18,761	1,194	125,609
Clyde Valley	4,851	70,828	36,021	26,888	2,354	140,943
Dumfries & Galloway	3,125	98,754	96,529	71,628	663	270,698
East Central	1,259	30,994	15,885	34,765	482	83,385
Eileanan an Iar	-	2,167	14,657	49,952	1,067	67,843
Fife	5,077	16,724	3,917	791	938	27,446
Highland	1,433	66,599	129,448	401,413	1,884	600,779
Lothian	4,040	15,403	15,011	5,286	650	40,390
North East Scotland	5,787	141,017	36,605	30,337	359	214,105
Orkney	-	23,857	7,632	1,392	25	32,907
Scottish Borders	2,193	42,495	65,892	38,468	71	149,119
Shetland	-	2,221	17,294	22,833	253	42,602
Tayside	6,115	43,040	50,622	83,200	311	183,287
No Region	1	20	43	238	22	325
All Regions	39,872	652,048	558,834	911,319	10,899	2,172,972

Table 9: Total stocked area (ha) in Phase 3 land per AgRegion and LCA Grouping

Stocked Area (Ha)		LCA Grouping				
AgRegion	Arable	Mixed	Improved	Rough	Other	All LCA
Argyll & Bute	368	17,106	45,051	116,749	519	179,792
Ayrshire	4,684	71,445	18,791	16,749	1,064	112,733
Clyde Valley	4,109	61,409	33,418	26,190	1,838	126,965
Dumfries & Galloway	2,711	89,410	89,763	68,153	546	250,583
East Central	983	25,007	14,662	33,753	355	74,759
Eileanan an Iar	-	1,614	12,643	39,341	926	54,524
Fife	3,208	13,317	3,536	719	742	21,522
Highland	981	55,760	113,944	320,511	1,475	492,671
Lothian	2,926	13,646	14,121	5,187	501	36,381
North East Scotland	4,044	116,316	31,879	26,349	244	178,833
Orkney	-	21,771	6,668	1,198	24	29,661
Scottish Borders	1,722	39,881	64,130	37,495	63	143,292
Shetland	-	1,995	16,143	21,659	238	40,036
Tayside	3,511	35,382	44,380	74,547	218	158,038
No Region	1	18	22	172	19	232
All Regions	29,248	564,078	509,151	788,771	8,774	1,900,022

Table 10: Total unstocked area (ha) in Phase 3 land per AgRegion and LCA Grouping

Unstocked Area (Ha)		LCA Grouping				
AgRegion	Arable	Mixed	Improved	Rough	Other	All LCA
Argyll & Bute	129	2,638	5,278	15,293	157	23,495
Ayrshire	2,451	14,409	2,598	3,048	204	22,710
Clyde Valley	1,636	15,922	3,751	1,519	787	23,616
Dumfries & Galloway	1,548	18,685	9,963	5,630	166	35,992
East Central	676	12,037	1,802	1,750	203	16,468
Eileanan an Iar	-	562	2,060	10,880	145	13,647
Fife	8,715	11,220	798	138	558	21,429
Highland	1,723	20,428	20,319	94,766	513	137,749
Lothian	5,250	5,568	1,616	261	404	13,100
North East Scotland	8,750	85,034	6,731	5,010	339	105,865
Orkney	-	4,510	1,342	226	4	6,083
Scottish Borders	2,023	11,252	4,263	1,992	24	19,553
Shetland	-	255	1,226	1,202	16	2,699
Tayside	14,325	24,359	7,931	10,314	325	57,255
No Region	1	3	22	73	8	107
All Regions	47,226	226,885	69,702	152,101	3,854	499,768

5.2. Livestock Numbers per AgRegion and LCA Grouping

Table 11: Total Livestock Units per AgRegion and LCA Grouping

Total LSU AgRegion	LCA Grouping					All LCA
	Arable	Mixed	Improved	Rough	Other	
Argyll & Bute	619	15,004	17,050	19,780	211	52,665
Ayrshire	9,281	110,456	15,013	8,450	1,045	144,246
Clyde Valley	6,504	80,731	19,779	6,477	2,309	115,800
Dumfries & Galloway	6,329	135,642	80,399	29,772	686	252,828
East Central	1,397	27,635	6,400	6,474	427	42,332
Eileanan an Iar	-	460	1,964	3,382	84	5,890
Fife	6,687	21,403	5,493	835	882	35,301
Highland	1,112	41,394	18,541	29,863	333	91,242
Lothian	4,744	15,023	7,290	1,714	610	29,382
North East Scotland	9,922	179,584	16,033	7,059	423	213,020
Orkney	-	26,496	7,118	870	27	34,511
Scottish Borders	2,884	40,527	37,302	10,805	39	91,558
Shetland	-	514	3,709	3,907	42	8,172
Tayside	6,193	38,032	16,028	12,634	158	73,046
No Region	1	11	7	31	3	53
All Regions	55,674	732,914	252,124	142,053	7,279	1,190,044

5.3. Forage Areas for SR ranges

Table 12: Distribution of forage areas (ha) per stocking rate, AgRegion, LCA Grouping

Forage Area (ha) Phase 3 AgRegion	Bin Values	LCA Group					All LCA
		Arable	Mixed	Improved	Rough	Other	
Argyll & Bute	All SRs	413	18,496	48,631	125,367	626	193,533
	SR=0	45	1,390	3,580	8,618	107	13,740
	SR<=0.25	6	3,189	22,013	97,626	331	123,165
	SR<=0.5	32	4,346	13,907	15,725	90	34,100
	SR<=1.0	78	4,360	5,854	3,171	43	13,506
	SR<=2.0	184	3,534	2,814	218	37	6,786
	SR<=4.0	68	1,654	440	9	17	2,188
	SR>>4.0	1	22	23	0	1	46
Ayrshire	All SRs	5,578	79,431	20,645	18,761	1,194	125,609
	SR=0	894	7,986	1,855	2,012	130	12,876
	SR<=0.25	189	3,556	3,542	6,501	55	13,844
	SR<=0.5	171	4,689	3,637	4,706	397	13,600
	SR<=1.0	371	15,343	7,234	4,412	204	27,564
	SR<=2.0	1,830	28,175	3,554	901	258	34,717
	SR<=4.0	1,937	18,720	721	212	142	21,730
	SR>>4.0	187	962	103	17	8	1,278

Forage Area (ha) Phase 3		LCA Group					
AgRegion	Bin Values	Arable	Mixed	Improved	Rough	Other	All LCA
Clyde Valley	All SRs	4,851	70,828	36,021	26,888	2,354	140,943
	SR=0	743	9,419	2,603	698	515	13,978
	SR<=0.25	240	4,474	9,710	18,304	151	32,879
	SR<=0.5	242	6,383	9,634	4,636	161	21,057
	SR<=1.0	766	15,666	8,926	2,628	625	28,610
	SR<=2.0	1,793	24,103	4,142	565	632	31,234
	SR<=4.0	1,067	10,074	957	52	239	12,388
	SR>>4.0	1	708	50	5	30	795
Dumfries & Galloway	All SRs	3,125	98,754	96,529	71,628	663	270,698
	SR=0	414	9,344	6,766	3,475	117	20,116
	SR<=0.25	83	4,619	11,659	26,435	26	42,823
	SR<=0.5	76	8,937	23,224	24,337	30	56,604
	SR<=1.0	191	18,728	26,853	13,014	215	59,001
	SR<=2.0	865	34,668	20,695	3,463	211	59,902
	SR<=4.0	1,220	19,839	6,718	721	35	28,532
	SR>>4.0	274	2,618	615	185	29	3,721
East Central	All SRs	1,259	30,994	15,885	34,765	482	83,385
	SR=0	277	5,987	1,223	1,012	127	8,626
	SR<=0.25	211	2,546	6,020	24,790	44	33,611
	SR<=0.5	108	3,609	4,788	8,282	48	16,835
	SR<=1.0	165	7,722	2,463	554	77	10,983
	SR<=2.0	250	8,162	1,195	112	158	9,877
	SR<=4.0	167	2,591	192	14	25	2,989
	SR>>4.0	82	376	4	0	3	465
Eileanan an Iar	All SRs		2,167	14,657	49,952	1,067	67,843
	SR=0		553	2,015	10,612	140	13,320
	SR<=0.25		1,205	11,455	38,475	903	52,039
	SR<=0.5		168	833	518	7	1,526
	SR<=1.0		193	207	215	15	630
	SR<=2.0		22	65	73	0	160
	SR<=4.0		17	55	52	0	124
	SR>>4.0		9	28	8	0	45
Fife	All SRs	5,077	16,724	3,917	791	938	27,446
	SR=0	1,870	3,407	381	72	195	5,924
	SR<=0.25	198	615	52	2	8	874
	SR<=0.5	218	486	129	50	164	1,047
	SR<=1.0	465	2,988	1,364	379	232	5,428
	SR<=2.0	1,182	5,760	1,407	206	241	8,796
	SR<=4.0	717	2,760	277	63	81	3,898
	SR>>4.0	429	708	308	19	16	1,479
Highland	All SRs	1,433	66,599	129,448	401,413	1,884	600,779
	SR=0	452	10,839	15,504	80,902	410	108,108

Forage Area (ha) Phase 3		LCA Group					
AgRegion	Bin Values	Arable	Mixed	Improved	Rough	Other	All LCA
	SR<=0.25	171	15,273	94,958	293,871	1,157	405,431
	SR<=0.5	131	8,869	10,493	22,495	100	42,087
	SR<=1.0	293	16,648	6,196	3,249	123	26,509
	SR<=2.0	274	12,485	1,968	727	81	15,536
	SR<=4.0	99	2,328	268	143	13	2,852
	SR>>4.0	14	157	60	25	0	255
Lothian	All SRs	4,040	15,403	15,011	5,286	650	40,390
	SR=0	1,114	1,758	890	99	149	4,009
	SR<=0.25	290	1,288	6,162	3,290	32	11,062
	SR<=0.5	154	1,658	2,703	805	122	5,442
	SR<=1.0	535	5,127	3,557	970	124	10,314
	SR<=2.0	1,175	4,135	1,540	106	149	7,106
	SR<=4.0	659	1,362	117	7	63	2,208
	SR>>4.0	113	75	41	9	11	250
North East Scotland	All SRs	5,787	141,017	36,605	30,337	359	214,105
	SR=0	1,742	24,707	4,726	3,988	114	35,278
	SR<=0.25	270	7,651	13,471	17,118	8	38,517
	SR<=0.5	176	10,622	9,333	6,605	5	26,741
	SR<=1.0	638	25,500	5,502	1,426	58	33,124
	SR<=2.0	1,243	47,373	2,615	952	105	52,287
	SR<=4.0	1,354	21,268	835	211	63	23,730
	SR>>4.0	364	3,897	124	38	6	4,428
Orkney	All SRs		23,857	7,632	1,392	25	32,907
	SR=0		2,087	964	195	1	3,247
	SR<=0.25		1,406	550	333	1	2,290
	SR<=0.5		1,738	975	151	1	2,866
	SR<=1.0		4,796	2,149	366	10	7,321
	SR<=2.0		11,935	2,386	297	10	14,628
	SR<=4.0		1,648	445	50	2	2,145
	SR>>4.0		248	162	0	0	411
Scottish Borders	All SRs	2,193	42,495	65,892	38,468	71	149,119
	SR=0	471	2,614	1,762	973	8	5,827
	SR<=0.25	118	2,790	13,611	20,092	16	36,628
	SR<=0.5	52	4,610	19,242	13,156	25	37,085
	SR<=1.0	432	15,698	22,103	3,613	13	41,860
	SR<=2.0	711	13,922	8,504	534	5	23,675
	SR<=4.0	334	2,799	641	100	3	3,876
	SR>>4.0	76	62	30	0	0	167
Shetland	All SRs		2,221	17,294	22,833	253	42,602
	SR=0		226	1,151	1,174	16	2,567
	SR<=0.25		1,394	11,979	18,530	203	32,106
	SR<=0.5		350	2,935	2,505	24	5,814

Forage Area (ha) Phase 3		LCA Group					
AgRegion	Bin Values	Arable	Mixed	Improved	Rough	Other	All LCA
	SR<=1.0		227	1,037	538	10	1,812
	SR<=2.0		22	149	70	0	241
	SR<=4.0		3	25	12	0	40
	SR>>4.0		0	18	5	0	22
Tayside	All SRs	6,115	43,040	50,622	83,200	311	183,287
	SR=0	2,604	7,658	6,242	8,653	93	25,249
	SR<=0.25	304	6,943	25,380	62,007	106	94,740
	SR<=0.5	416	6,062	8,692	9,246	32	24,447
	SR<=1.0	650	10,327	7,197	2,587	29	20,790
	SR<=2.0	1,094	8,932	2,665	595	26	13,313
	SR<=4.0	825	2,420	370	81	15	3,711
	SR>>4.0	222	698	77	32	9	1,037
No Region	All SRs	1	20	43	238	22	325
	SR=0	0	2	22	66	3	93
	SR<=0.25	0	6	14	145	18	183
	SR<=0.5	0	7	1	18	1	27
	SR<=1.0	0	2	6	5	0	13
	SR<=2.0	0	4	1	2	0	7
	SR<=4.0	0	0	0	1	0	2
	SR>>4.0	0	0	0	0	0	0
Phase 3 Totals	All SRs	39,872	652,048	558,834	911,319	10,899	2,172,972
	SR=0	10,624	87,977	49,683	122,548	2,126	272,958
	SR<=0.25	2,080	56,955	230,577	627,517	3,061	920,190
	SR<=0.5	1,776	62,534	110,526	113,234	1,209	289,279
	SR<=1.0	4,585	143,326	100,648	37,127	1,779	287,464
	SR<=2.0	10,600	203,233	53,698	8,821	1,915	278,267
	SR<=4.0	8,445	87,483	12,060	1,729	696	110,413
	SR>>4.0	1,762	10,540	1,642	343	113	14,400

5.4. Weighted Average SRs for SR ranges.

Table 13: Distribution of Average SR values per stocking rate, AgRegion, LCA Grouping

AgRegion	Average SR per Bin (Phase3)		LCA Group				
	Bin Values	Arable	Mixed	Improved	Rough	Other	All LCA
Argyll & Bute	SR=0	-	-	-	-	-	-
	SR<=0.25	0.24	0.15	0.13	0.13	0.13	0.14
	SR<=0.5	0.44	0.36	0.36	0.35	0.35	0.36
	SR<=1.0	0.65	0.73	0.70	0.65	0.69	0.71
	SR<=2.0	1.66	1.52	1.48	1.62	1.61	1.52
	SR<=4.0	3.07	2.57	2.49	2.60	2.65	2.57
	SR>>4.0	4.73	5.23	8.25		8.81	6.26
Ayrshire	SR=0	-	-	-	-	-	-
	SR<=0.25	0.16	0.15	0.16	0.16	0.15	0.15
	SR<=0.5	0.36	0.39	0.38	0.38	0.37	0.38
	SR<=1.0	0.76	0.74	0.73	0.74	0.75	0.73
	SR<=2.0	1.52	1.48	1.42	1.40	1.45	1.47
	SR<=4.0	2.59	2.56	2.42	2.54	2.52	2.56
	SR>>4.0	5.09	7.43	19.98	51.21	6.10	8.79
Clyde Valley	SR=0	-	-	-	-	-	-
	SR<=0.25	0.15	0.15	0.15	0.13	0.14	0.14
	SR<=0.5	0.38	0.38	0.35	0.38	0.37	0.37
	SR<=1.0	0.73	0.76	0.77	0.76	0.77	0.76
	SR<=2.0	1.53	1.47	1.41	1.36	1.45	1.46
	SR<=4.0	2.79	2.59	2.56	2.47	2.67	2.60
	SR>>4.0	16.55	6.77	9.19	4.27	6.76	7.06
Dumfries & Galloway	SR=0	-	-	-	-	-	-
	SR<=0.25	0.10	0.16	0.17	0.18	0.17	0.17
	SR<=0.5	0.28	0.38	0.38	0.37	0.37	0.37
	SR<=1.0	0.78	0.77	0.75	0.73	0.77	0.76
	SR<=2.0	1.52	1.47	1.42	1.35	1.46	1.44
	SR<=4.0	2.78	2.60	2.57	2.54	2.68	2.60
	SR>>4.0	5.79	6.19	6.73	6.26	7.32	6.30
East Central	SR=0	-	-	-	-	-	-
	SR<=0.25	0.11	0.15	0.14	0.13	0.13	0.14
	SR<=0.5	0.35	0.38	0.34	0.34	0.40	0.37
	SR<=1.0	0.78	0.78	0.75	0.72	0.76	0.77
	SR<=2.0	1.51	1.34	1.33	1.25	1.41	1.35
	SR<=4.0	2.43	2.53	2.34	2.37	2.29	2.50
	SR>>4.0	4.89	5.26	5.10	5.40	20.20	5.55
Eileanan an Iar	SR=0	-	-	-	-	-	-
	SR<=0.25		0.09	0.10	0.09	0.09	0.10
	SR<=0.5		0.37	0.33	0.34	0.34	0.34
	SR<=1.0		0.76	0.69	0.69	0.63	0.70

Average SR per Bin (Phase3)		LCA Group					
AgRegion	Bin Values	Arable	Mixed	Improved	Rough	Other	All LCA
	SR<=2.0		1.40	1.47	1.30	1.15	1.39
	SR<=4.0		2.75	2.89	2.69	2.27	2.81
	SR>>4.0		5.62	14.47	16.58	17.19	13.70
Fife	SR=0	-	-	-	-	-	-
	SR<=0.25	0.10	0.07	0.08	0.09	0.03	0.08
	SR<=0.5	0.38	0.39	0.44	0.40	0.41	0.40
	SR<=1.0	0.77	0.77	0.77	0.75	0.77	0.77
	SR<=2.0	1.43	1.37	1.36	1.42	1.39	1.38
	SR<=4.0	2.54	2.56	2.58	2.64	2.47	2.55
	SR>>4.0	6.73	6.12	6.13	5.36	7.13	6.29
Highland	SR=0	-	-	-	-	-	-
	SR<=0.25	0.11	0.12	0.10	0.09	0.07	0.10
	SR<=0.5	0.41	0.37	0.36	0.35	0.36	0.36
	SR<=1.0	0.78	0.75	0.72	0.71	0.76	0.74
	SR<=2.0	1.47	1.35	1.29	1.36	1.36	1.35
	SR<=4.0	2.73	2.48	2.47	2.50	2.70	2.50
	SR>>4.0	7.51	7.24	7.30	6.90	5.08	7.18
Lothian	SR=0	-	-	-	-	-	-
	SR<=0.25	0.14	0.15	0.15	0.15	0.14	0.15
	SR<=0.5	0.34	0.38	0.37	0.38	0.39	0.37
	SR<=1.0	0.77	0.78	0.77	0.79	0.78	0.77
	SR<=2.0	1.39	1.37	1.34	1.28	1.41	1.36
	SR<=4.0	2.65	2.63	2.58	2.40	2.48	2.61
	SR>>4.0	8.19	13.09	11.43	5.79	9.10	9.87
North East Scotland	SR=0	-	-	-	-	-	-
	SR<=0.25	0.08	0.13	0.12	0.11	0.06	0.12
	SR<=0.5	0.41	0.38	0.37	0.37	0.41	0.38
	SR<=1.0	0.78	0.78	0.76	0.77	0.78	0.78
	SR<=2.0	1.55	1.44	1.43	1.42	1.48	1.44
	SR<=4.0	2.80	2.65	2.64	2.60	2.59	2.66
	SR>>4.0	8.71	7.69	9.47	7.65	5.93	7.91
Orkney	SR=0	-	-	-	-	-	-
	SR<=0.25		0.13	0.13	0.12	0.13	0.13
	SR<=0.5		0.38	0.36	0.38	0.38	0.38
	SR<=1.0		0.78	0.82	0.77	0.82	0.79
	SR<=2.0		1.42	1.39	1.37	1.42	1.41
	SR<=4.0		2.33	2.41	2.27	2.36	2.35
	SR>>4.0		6.64	4.93			5.85
Scottish Borders	SR=0	-	-	-	-	-	-
	SR<=0.25	0.09	0.15	0.16	0.15	0.14	0.15
	SR<=0.5	0.36	0.38	0.38	0.37	0.37	0.38
	SR<=1.0	0.80	0.76	0.74	0.72	0.76	0.75
	SR<=2.0	1.40	1.35	1.26	1.18	1.29	1.32

Average SR per Bin (Phase3)		LCA Group					
AgRegion	Bin Values	Arable	Mixed	Improved	Rough	Other	All LCA
	SR<=4.0	2.43	2.58	2.37	2.48	2.45	2.52
	SR>>4.0	8.93	8.99	7.54		10.56	8.63
Shetland	SR=0		-	-	-	-	-
	SR<=0.25		0.15	0.14	0.14	0.14	0.14
	SR<=0.5		0.38	0.35	0.34	0.33	0.35
	SR<=1.0		0.72	0.68	0.69	0.68	0.69
	SR<=2.0		1.39	1.28	1.25	1.18	1.29
	SR<=4.0		2.58	2.20	2.51		2.44
	SR>>4.0			6.19	13.00		7.89
Tayside	SR=0	-	-	-	-	-	-
	SR<=0.25	0.14	0.15	0.13	0.12	0.12	0.13
	SR<=0.5	0.37	0.38	0.38	0.38	0.38	0.38
	SR<=1.0	0.76	0.74	0.72	0.71	0.76	0.74
	SR<=2.0	1.39	1.34	1.28	1.29	1.35	1.33
	SR<=4.0	2.68	2.62	2.45	2.41	2.65	2.60
	SR>>4.0	8.04	12.42	6.02	6.38	4.60	10.08
No Region	SR=0	-	-	-	-	-	-
	SR<=0.25	0.22	0.10	0.10	0.09	0.10	0.10
	SR<=0.5	0.30	0.37	0.34	0.34	0.38	0.35
	SR<=1.0	0.73	0.75	0.69	0.74	0.69	0.72
	SR<=2.0	1.50	1.36	1.43	1.43	1.37	1.39
	SR<=4.0	2.12	2.81	2.49	2.48	2.78	2.59
	SR>>4.0	4.21			32.72		14.88
All Regions	SR=0	-	-	-	-	-	-
	SR<=0.25	0.12	0.13	0.13	0.12	0.10	0.13
	SR<=0.5	0.37	0.38	0.37	0.36	0.37	0.37
	SR<=1.0	0.76	0.76	0.75	0.73	0.76	0.75
	SR<=2.0	1.48	1.43	1.39	1.36	1.44	1.42
	SR<=4.0	2.68	2.59	2.54	2.54	2.58	2.59
	SR>>4.0	7.14	7.28	8.00	10.18	7.22	7.49