

Pesticide Usage in Scotland



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An Official Statistics Publication for Scotland

Local Authority Integrated Weed Control Survey – 2019

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Executive summary

This report presents the results of a voluntary survey of weed control measures used by Scottish local authorities (LAs) in 2019. Of the 32 LAs contacted, herbicide use data were received from 27 and details of integrated weed management practices from 28. These LAs collectively represent 89 per cent of Scotland's land area and 92 per cent of the population and, as such, provide a robust overview of Scottish LA integrated weed management practices.

All responding LAs employed integrated control methods, adopting a combination of herbicide and non-chemical weed control strategies. The most commonly used non-chemical methods employed were mechanical control (cutting, strimming, flailing and mowing as well as weed brushing and ripping), hand weeding and suppressing weed growth with mulches. Almost all respondents (96 per cent) also adopted weed prevention methods to reduce the need for control, including using mulches (93 per cent), replacing annual flower beds with perennial beds to reduce inputs (79 per cent), mapping and targeting areas where most control is needed (36 per cent) and resurfacing areas to reduce the need for control (32 per cent).

A range of reasons for using non-chemical approaches were reported, with the main drivers being concern about environmental impacts and a desire to reduce operator and public exposure to herbicides. Where herbicides were applied, all respondents stated that they took steps to reduce their use, primarily by evaluating whether there were alternative non-chemical control measures and by minimising and targeting herbicide use. The main reasons stated for choosing to use herbicides over alternative controls were for control of invasive weeds, maintenance of acceptable visual appearance and protection of infrastructure. Where herbicides were used, they were reported to be more effective over a longer period, with a lower associated cost, than alternatives. Some LAs also reported that there was limited availability of alternative control methods.

The surveyed LAs collectively applied 15.2 tonnes of herbicide active substance in 2019. Twelve active substances were used in total and, in common with other amenity use settings, glyphosate is the most widely approved and used herbicide (99 per cent by weight). Three LAs stated that they had prohibited or restricted the use of glyphosate on some surfaces in 2019/20 (during or after the survey data collection period). One further LA stated that they were currently reviewing their future use of glyphosate.

Where specified, most herbicide applications were by knapsack sprayer (58 per cent), vehicle mounted boom sprayer (18 per cent) and vehicle mounted lance sprayer (15 per cent). Where specified, 55 per cent of herbicide applications were to hard surfaces, 17 per cent to soft surfaces and 28 per cent to a combination of both.

Twenty four respondents (86%) stated that they planned to continue to reduce the amount of herbicide applied in the future and several stated they were currently exploring alternative methods of control.

Introduction

The Scottish Government (SG) is responsible for post-approval surveillance of pesticide use in Scotland. This is conducted by the Pesticide Survey Unit at SASA, a division of the Scottish Government's Agriculture and Rural Economy Directorate.

A survey of Scottish Local Authority (LA) weed control activities during 2019, was conducted. This is the first survey of its kind carried out in Scotland and was designed to inform the Scottish Government about the weed control strategies used by LAs and to address a data gap in relation to pesticide use in urban and non-agricultural settings.

UK level pesticide use in amenity settings, including LAs, is surveyed and published by Fera Science Ltd every four years. The last published UK survey was conducted in 2016⁽¹⁾ with the 2020 survey scheduled to be published in spring 2022. Response rates from LAs to the UK surveys have been historically low (only nine per cent of those contacted contributed data in 2016) and the data is not robust enough to be published at a sub-UK level. Local authorities are responsible for the majority of urban pesticide use, which is mainly focussed on weed control; herbicide use accounted for 99.5 per cent of pesticide use by weight in 2016⁽¹⁾. As a consequence, this survey focussed on weed management practices, including herbicide and non-chemical measures, by Scottish LAs. The aim of this survey was to provide baseline data to understand how herbicides are currently used in these settings. This data can also be used to assess changes in weed control strategies in the future.

The Scottish Pesticide Usage reports have been designated as Official Statistics since August 2012 and as National Statistics since October 2014. As this survey is the first of its kind and has not been formally assessed it has been published as an Official Statistics publication. The Chief Statistician (Roger Halliday) acts as the statistics Head of Profession for the Scottish Government and has overall responsibility for the quality, format, content and timing of all Scottish Government national statistics publications, including the pesticide usage reports. As well as working closely with Scottish Government statisticians, SASA receive survey specific statistical support from Biomathematics and Statistics Scotland ([BioSS](#)).

All reports are produced according to a published timetable. For further information in relation to Pesticide Survey Unit publications and their compliance with the code of practice please refer to the pesticide usage survey section of the [SASA website](#). The website also contains other useful documentation such as [privacy](#) and [revision](#) policies, [user feedback](#) and detailed background information on survey [methodology](#) and [data uses](#).

Structure of report and how to use these statistics

This report is intended to provide data in a useful format to a wide variety of data users. The results section presents the results from this survey for both herbicide and non-chemical weed control measures.

Appendix 1 contains tables of results, including estimates of herbicide use and responses to questions about integrated weed management practices. Appendix 2 summarises survey statistics including survey response rates. Appendix 3 outlines the estimated financial burden to survey respondents. Appendix 4 defines many of the terms used throughout the report. Appendix 5 describes the methods used during sampling and data collection. A copy of the survey questionnaire which was sent to all LAs is available in Appendix 6.

Results

Local Authority data provision and survey coverage

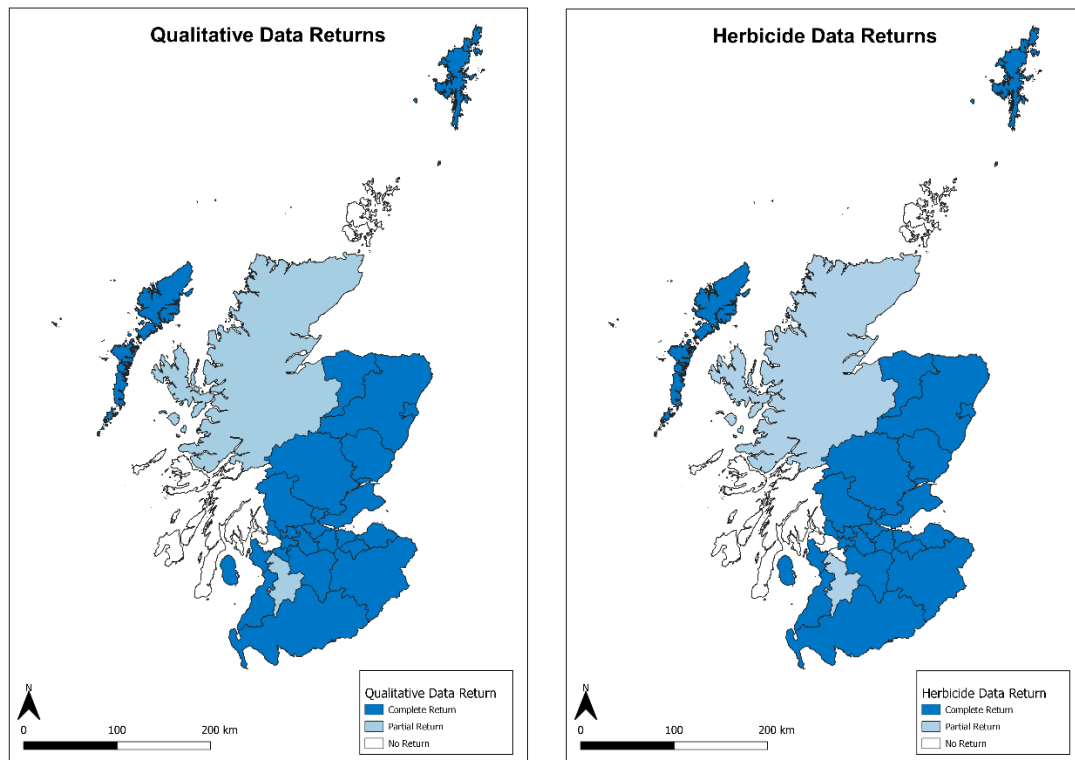
All 32 local authorities (LAs) in Scotland were contacted and asked to supply data relating to their weed control measures during 2019. Twenty-eight LAs responded to this voluntary survey in total (Figure 1). These LAs collectively represented 89 per cent of the Scottish land area and 93 per cent of the Scottish population (Table 9, Appendix 2). The remaining four LAs did not respond to the survey.

This was a complex data request, asking for weed control information in relation to a variety of use types and settings which had been conducted by a range of operatives and contractors. Of the 28 responses, one LA only supplied qualitative data on control measures and not herbicide use, therefore the herbicide data presented represents 27 LAs (covering 89 per cent of Scotland's land area and 92 per cent of the population).

Of those 27 LAs providing herbicide use data, two LAs could only provide partial data (weed management in greenspaces e.g. parks, gardens etc but could not include use on areas such as highways or footpaths). A further two LAs provided quantities of pesticides purchased, rather than applied, due to time constraint and resourcing issues, but confirmed that usage closely matched the quantity purchased. In addition, whilst the majority of LAs provided data for the 2019 calendar year, a proportion (ca 19 per cent) kept records on a financial year basis and provided data for April 2019 to March 2020.

It should be noted that the information presented in this report only represents the data collected and does not attempt to estimate total Scottish herbicide use by LAs (refer to methodology section, Appendix 5). However, despite this incomplete coverage and some minor inconsistencies in data availability, the results of this survey provide a good representation of current weed control practices employed by Scottish LAs.

Figure 1 Scottish LAs supplying 2019 data



Integrated weed control strategies

Qualitative data on weed control attitudes and strategies was received from 28 LAs representing 89 per cent of Scottish land area and 93 per cent of the Scottish population. As described previously, it must be noted that two LAs provided partial data, with their response relating to weed management in greenspaces only. In addition, one LA provided three separate responses from different departments which were amalgamated, for further information on survey methodology please refer to Appendix 5.

Integrated weed management (IWM) is a weed management program based on a combination of preventative, cultural, mechanical and chemical practices. Therefore, control programmes incorporate non-herbicide methods alongside, or instead of, herbicide control. As part of an IWM approach, use of herbicides should be as targeted as possible. To gain a greater understanding of IWM techniques used in the amenity sector, LAs were asked a series of questions related to their awareness of IWM and their weed control practices.

Integrated weed management awareness and policy

LAs were asked about membership of industry associations or schemes that promote integrated weed control. Fourteen per cent were members of the Amenity Forum. The Amenity Forum is the UK's industry led voluntary initiative, promoting best practice and the safe and sustainable management of weeds, pests and diseases across the amenity sector⁽²⁾. No LAs were members of Amenity Assured or the Property Care Association (PCA) Invasive Weed Code. These schemes ensure amenity contractors are recognised and qualified to offer professional pesticide services and advice to the amenity sector. However, 57 per cent of the LAs (16) were aware of the new UK Amenity Standard which was launched in February 2020. Ten of these LAs stated that they will require their own personnel, or those responsible for weed control on their behalf to be compliant with the UK Amenity Standard. The UK Amenity Standard is a quality management benchmark, to ensure that public spaces are maintained to the highest professional levels, seeking to keep all amenity areas safe and healthy for all to use⁽³⁾.

All 28 local authorities who responded stated that they used non-herbicide methods of weed control. However, only one LA had a formal policy about the integrated control of weeds. No LA had a formal Integrated Weed Management plan although one was in the process of producing one.

Seventeen LAs (61 per cent) stated that they were aware of the Defra Best Practice Guidance⁽⁴⁾ for integrated and non-chemical amenity hard surface weed control. This guidance was produced by Defra in 2015, primarily for LAs, to help minimise pesticide use in public spaces, to protect the environment, reduce pesticide resistance and improve public perception. A further 10 stated that they were aware of the Amenity Forum Integrated Weed Management Guidance and Template for creating an Integrated Weed Management Plan.

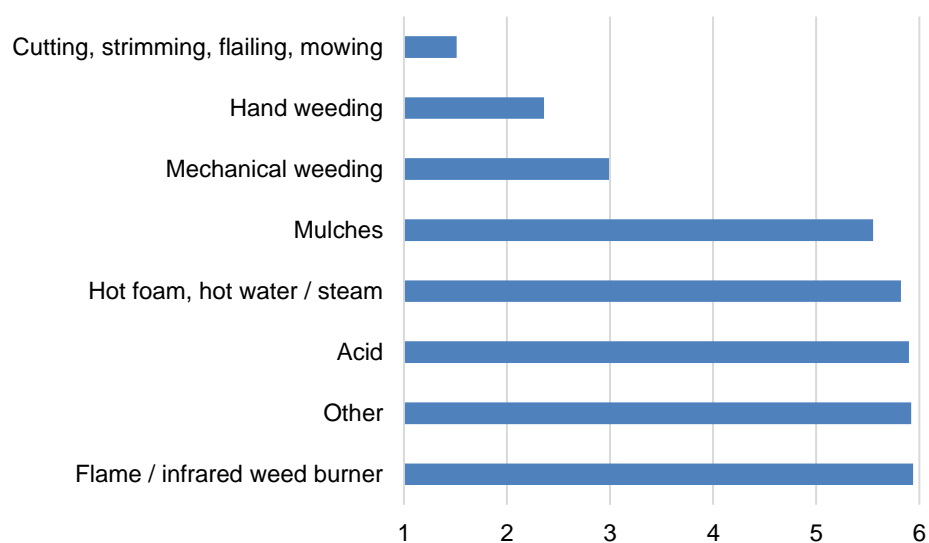
Overall, local authority awareness and adoption of IWM practices is high. All participating LAs adopted integrated methods of control, although most were yet to develop a formal policy or adopt a formal IWM plan. This is likely to improve as more LAs comply with the new Amenity Standard in future.

Adoption of integrated weed management practices

Twenty seven of the LAs (96 per cent of respondents) stated that they used weed prevention methods to reduce the need for subsequent weed control, which is a central principle of IWM (Table 1). The most commonly used method was mulching, used by 26 LAs (93 per cent), followed by replacing annual flower beds with perennial beds to reduce maintenance input requirements (22 LAs, 79 per cent). Other methods included identifying or mapping of priority areas to target control effort (10 LAs, 36 per cent) and resurfacing of public areas such as replacing slabs with asphalt to reduce the need for weed control (nine LAs, 32 per cent). Three LAs (11 per cent) also reported improving drainage/soil aeration as a method of weed prevention.

Local Authorities were provided with a list of non-herbicide approaches to weed control and asked to indicate the options used by them, or by a contractor on their behalf, during 2019. They were also asked to rank the methods in relation to which are the most commonly used. Please see Appendix 5 Survey methodology for a description of the statistical methods used. Weed control by cutting, strimming, flailing or mowing was most commonly used, followed by hand weeding and then mechanical weeding such as weed brushing or ripping (Figure 2, Table 2). All other methods were used less frequently. No LAs reported using electrocution, grazing or biological control to control weeds.

Figure 2 Mean ranking of non-herbicide control measures used by Scottish LAs in 2019

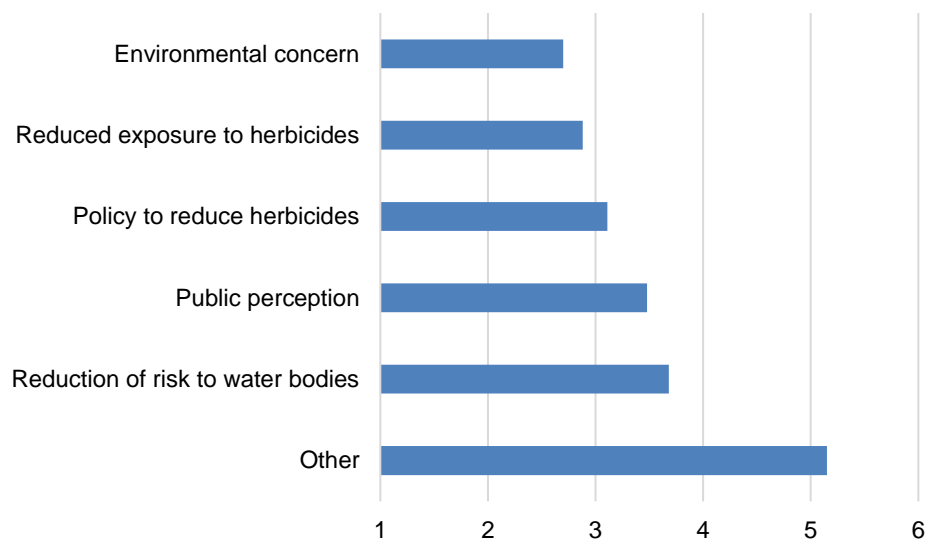


“Other” included creation of wildflower areas to reduce the need for weed control. No LAs reported using electrocution, grazing or biological control to control weeds. Please note for the rank, the lower the number the more commonly the method is used. Please see Appendix 5 Survey methodology for a description of statistical methods used.

As well as adopting non-chemical control measures, 21 local authorities (75% of respondents) stated that they assessed how effective these control measures had been. Review of effectiveness is also a central principle of IWM.

Where non-herbicide methods of control were used by LAs, they were asked to rank the main reasons for their use. Mean ranking of reasons for using non-herbicide control methods are presented in Figure 3 and Table 3. The reasons ranked as most important were; concern about the environmental risk of herbicide use and to reduce operator and public exposure to herbicides. Public perception of spraying herbicides and reduction of risk to water bodies were both (on average) rated as less important by respondents. The category rated least important was where herbicide control was not possible and hand weeding was the only option, e.g. in shrub beds where herbicide use would damage ornamental planting (it should be noted that this was recorded under the “Other” category by a single respondent).

Figure 3 Mean ranking of reasons Scottish LAs used non-herbicide control measures for in 2019



“Other” included where herbicide control was not possible and hand weeding was the only option, e.g. in shrub beds where herbicide use would damage ornamental planting. Please note for the rank, the lower the number the more important the reason. Please see Appendix 5 Survey methodology for a description of statistical methods used.

Herbicide use data

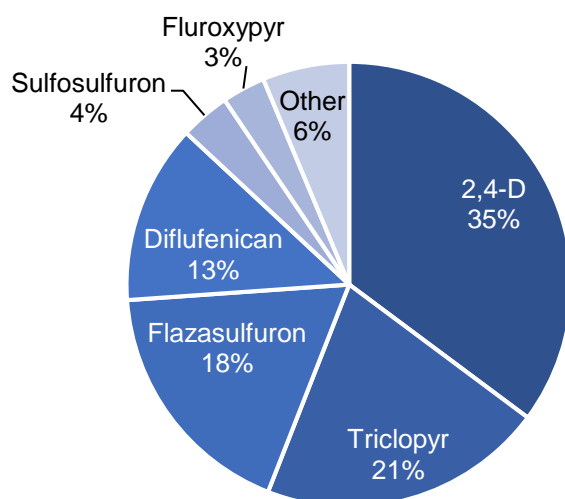
These data represent herbicide use in 27 Scottish LAs (which collectively account for 89 per cent of the Scottish land area and 92 per cent of the Scottish population). As described previously, it should be noted that two LAs provided partial herbicide use data (for greenspaces only) and a further two LAs provided quantities of pesticides purchased for use in 2019 as a proxy for quantities used.

Herbicide active substances used

The 27 LAs who provided data collectively applied 43.5 tonnes of 31 different herbicide products in 2019 (Table 4). These products contained 12 active substances, combined into 11 different formulations (combinations of active substances) (please see Appendix 4 for definitions of products, formulations and active substances).

Glyphosate was the main formulation used (14,553 kg) followed by glyphosate/sulfosulfuron (360 kg) and diflufenican/glyphosate (171 kg) (Table 4). In relation to active substances, over 15,000 kg of herbicide used was glyphosate, which accounted for 99 per cent of the total herbicide active ingredient weight applied (Table 5). After Glyphosate the most common active substances were 2,4-D, triclopyr and flazasulfuron (Figure 4, Table 5).

Figure 4 Non-Glyphosate active substances used by Scottish LAs in 2019



“Other” includes aminopyralid, MCPA, dicamba, mecoprop-P and florasulam.

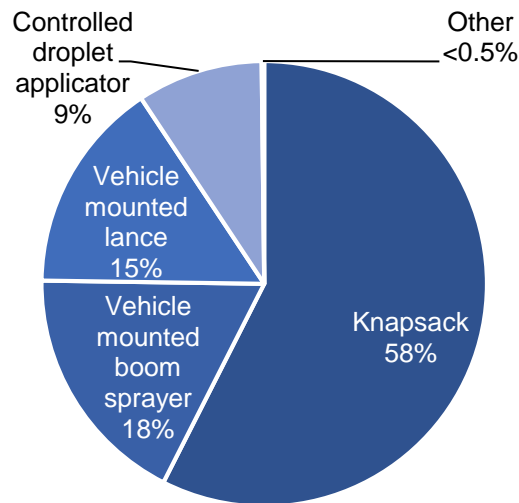
Glyphosate is an effective and widely used herbicide which is used to manage a variety of weeds in the amenity sector. The sector has a limited choice of active substances which are approved in amenity settings. Unlike many other herbicides, glyphosate is systemic and broad-spectrum, effectively controlling both grasses and broadleaved weeds, making it one of the most widely used, cost-effective tools for weed management. Glyphosate has been approved for use in both agricultural and amenity environments for over 40 years.

Whilst there has been some controversy about glyphosate use, this active substance is currently approved for use in both the European Union (EU) and Great Britain (GB). Approval was granted in 2017 following regulatory evidence assessment by Germany and subsequent review by two independent European expert scientific bodies; the European Food Safety Authority (EFSA) and the European Chemicals Agency (ECHA). All assessments concluded that glyphosate met approval conditions for use and did not pose an unacceptable risk to human or environmental health. Glyphosate's EU approval expires in December 2022 and is currently being reviewed. Following EU exit, GB is operating a pesticide regime independently from the EU. To allow time to plan and implement the GB review programme all active substance approvals due to expire before December 2023 were extended for three years. Therefore, the GB glyphosate approval expires in December 2025. The Health and Safety Executive (HSE), which acts as the regulatory authority on behalf of Scotland, England and Wales, will robustly assess the regulatory evidence before providing a GB recommendation on approval. A recent Scottish Plant Health Centre report concluded that loss of glyphosate would be estimated to have an impact on the UK amenity sector of over £200 million per annum⁽⁵⁾.

Methods of application

A method of application was provided for 73 per cent of all herbicide treatments in terms of weight of active substance applied. Where specified, knapsack sprayers accounted for 58 per cent of all applications, vehicle mounted boom sprayers 18 per cent, vehicle mounted lance sprayers 15 per cent and controlled droplet applicators nine per cent (Figure 5). Controlled droplet applicators produce very even spray droplets which can reduce spray drift and improve efficacy. Other methods of application, including rotary applicators, stem injections and Ecoplugs (which are drilled into tree stumps), accounted for less than 0.5 per cent of weight of active substance applied.

Figure 5 Methods of application used by Scottish LAs in 2019 (percentage by weight applied)

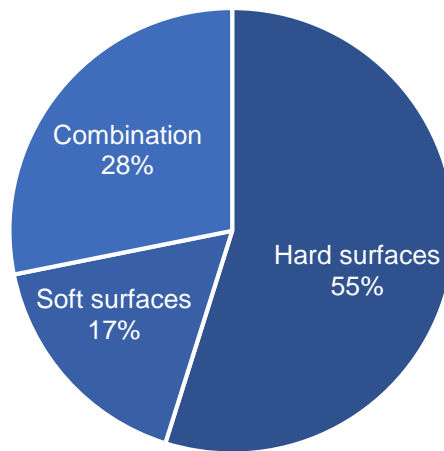


“Other” includes rotary applicators, stem injection and Ecoplugs which are drilled into tree stumps. Please note some LAs provided multiple methods of application for herbicide products. Where use could not be attributed to individual methods (16 per cent of the weight applied), these were excluded from the above calculations.

Surface type

Local Authorities were asked to provide information on the type of surfaces herbicides were applied to. The type and quality of data provided varied by respondent. Many LAs were unable to breakdown herbicide use to specific surface types but were able to indicate generally if application was to a range of surface types. For reporting purposes these have been amalgamated into applications to hard surfaces and to soft surfaces. Hard surfaces included roads, pavements, kerbs, paths, playgrounds, car parks and gravel. Soft surfaces included amenity grass/parks, trees/shrubs, woodland, bowling greens, invasive species and sports turf/pitches. In terms of weight applied, surface type data was provided for 86 per cent of all active substances applied. Where specified, 55 per cent was to hard surfaces, 17 per cent was to soft surfaces and 28 per cent was to a combination of both (Figure 6).

Figure 6 Surface types herbicides were applied to by Scottish LAs in 2019 (percentage by weight applied)



Hard surfaces include roads, pavements, kerbs, paths, playgrounds, car parks and gravel
Soft surfaces include amenity grass/parks, trees/shrubs, woodland, bowling greens, invasive species, sports turf/pitches.

Combination is used when the LA provided a list of surface types for each product which included both hard and soft surfaces and it was not possible to determine the weight applied to each type.

In terms of weight applied, surface type data was provided for 86 per cent of all active substances applied.

Reasons for use

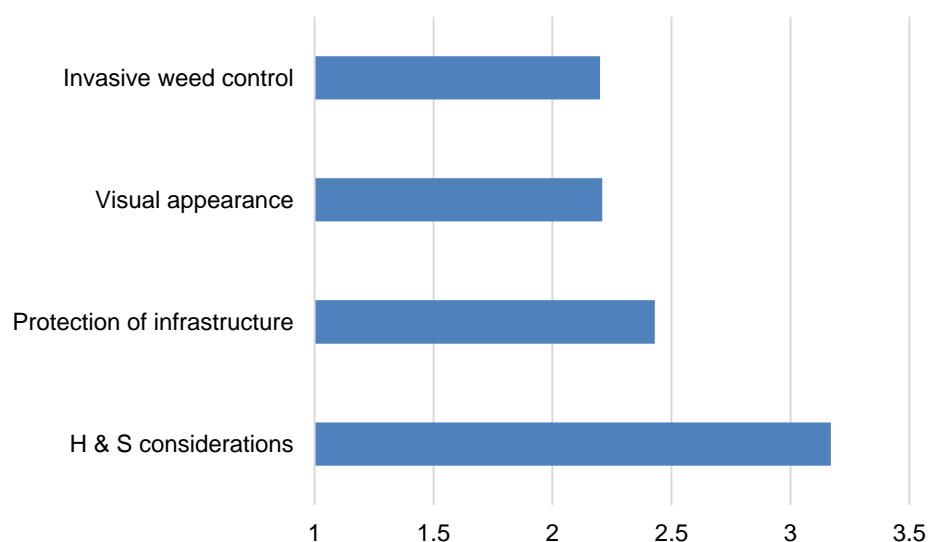
Reasons were provided for 80 per cent of use of active substances. Where specified, general weed control (on various surface types) was the main reason given for herbicide use, accounting for 99 per cent of the weight applied. Treatment of invasive species and tree stumps accounted for just over one per cent. The only weed species specified were Japanese Knotweed and Giant Hogweed.

Qualitative data relating to herbicide use

In addition to questions on non-herbicide methods of control, LAs were also asked questions about reasons for using herbicides and steps taken to target and minimise their use.

All of the LAs who responded stated that they used herbicides. LAs were asked to indicate the reasons for their use and to rank these in order of importance, with 1 being the most important. The mean rank of herbicide use reasons are presented in Figure 7 and Table 6. Invasive weed control and visual appearance were the main reasons for use of herbicides in LA settings, followed by protection of infrastructure. Health and safety considerations were ranked the least important reason for use. One LA stated that whilst health and safety was important there is little evidence to suggest that accidents are caused by weed growth.

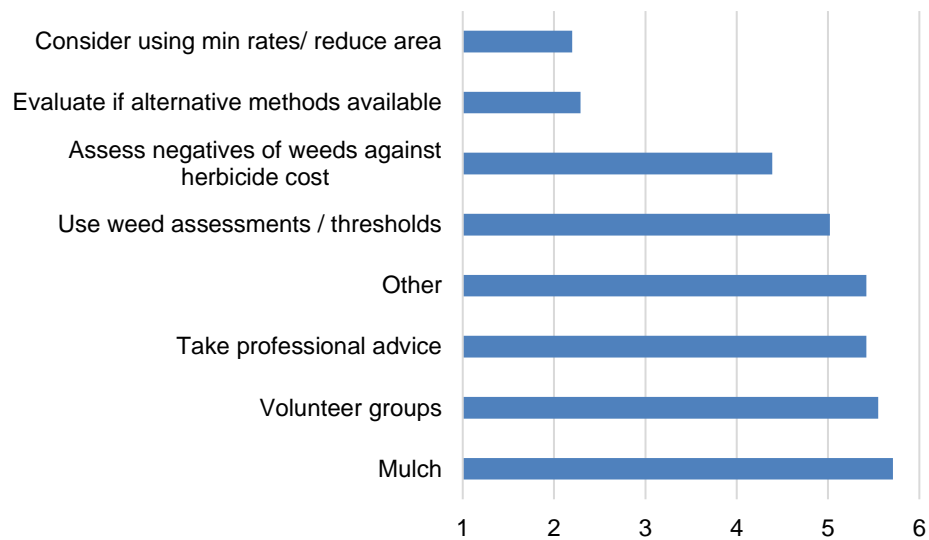
Figure 7 Mean ranking for reasons for using herbicides by Scottish LAs in 2019



Please note for the rank, the lower the number the more important the reason. Please see Appendix 5 Survey methodology for a description of statistical methods used.

All 28 LAs reported that they took steps to minimise and target their use of herbicides. The steps taken to minimise herbicide use are presented in Figure 8 and Table 7. It is evident that the primary steps taken to minimise use were both evaluation of whether there were alternative methods of control available, and also consideration of using the minimum product rate or reducing the area sprayed. Some LAs also cited whether the financial loss, damage or visual effect caused by the weed outweighed the cost of herbicide application as a commonly used criterion while others did not. Other actions such as use of weed assessments or thresholds prior to herbicide application and taking on advice from a professional agronomist adviser were amongst the least commonly used criteria. Other reasons provided included the use of mulch to minimise weed growth and reduce herbicide applications and using volunteer groups to help remove weeds and reduce the need for herbicide use.

Figure 8 Mean ranking for steps taken to minimise herbicide use by Scottish LAs in 2019



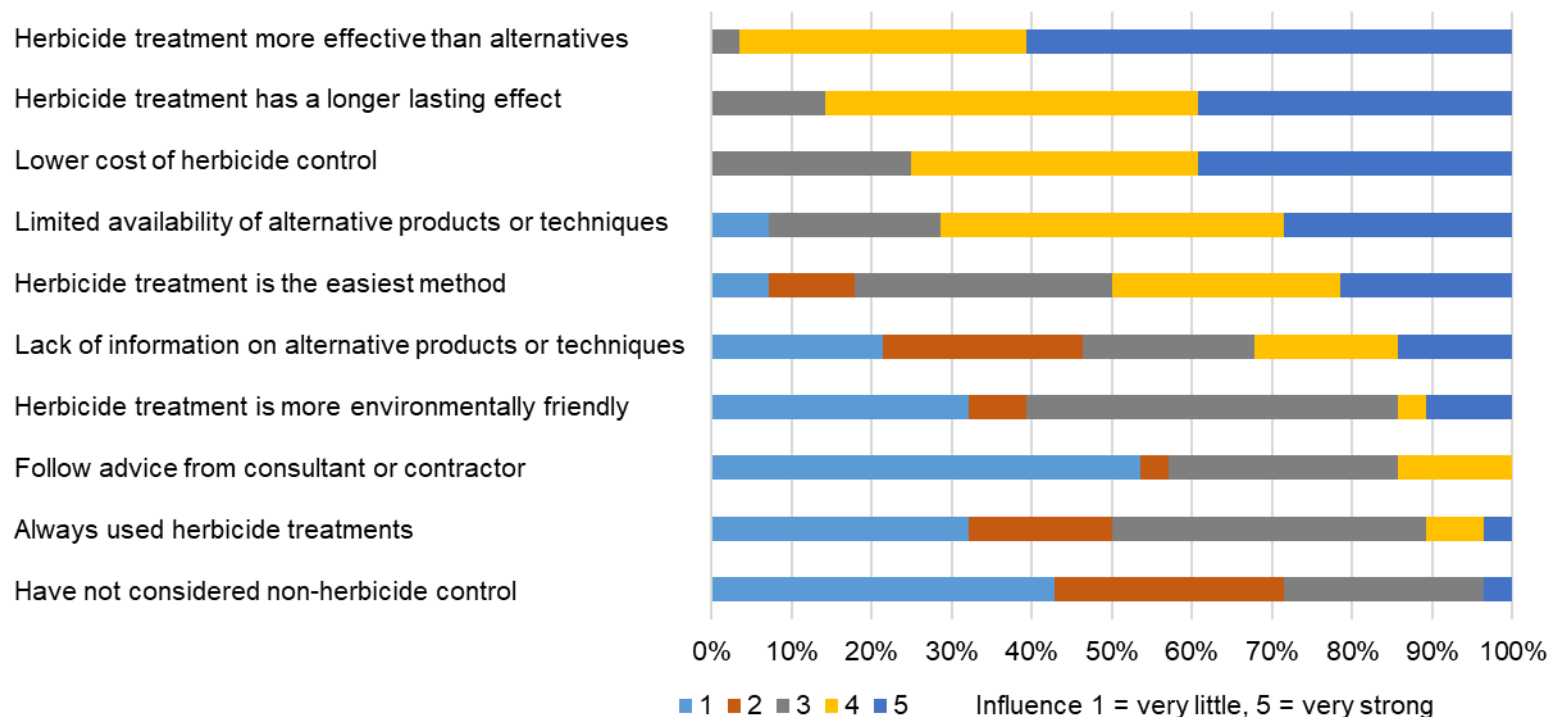
Please note for the rank, the lower the number the more commonly used the criteria. Other includes identification and continued roll out of controlled biodiversity areas, use of controlled droplet applicator and reduced frequency of street spraying. Please see Appendix 5 Survey methodology for a description of statistical methods used.

LAs were also presented with a list of factors and asked how strongly they influenced their decision to use herbicides rather than non-herbicide alternatives on a scale (1 equals little influence to 5 equals strong influence). Please see Appendix 5 Survey methodology for a description of the statistical methods used. The mean ratings and percentages of respondents rating each factor as a strong or weak influence are presented in Figure 9 and Table 8.

The respondents stated that the fact that herbicide treatments were more effective than non-chemical alternatives had the strongest influence on choosing to use herbicides. The perceived longer lasting effects of herbicide control, as well as their lower cost, also had a strong influence as did the limited availability of alternative control techniques.

LAs were given the opportunity to provide other factors which influenced their decision making process. Two LAs suggested that budget and manpower constraints were a reason they used herbicides rather than alternatives.

Figure 9 Factors influencing Scottish local authority decisions to use herbicides rather than alternatives - 2019

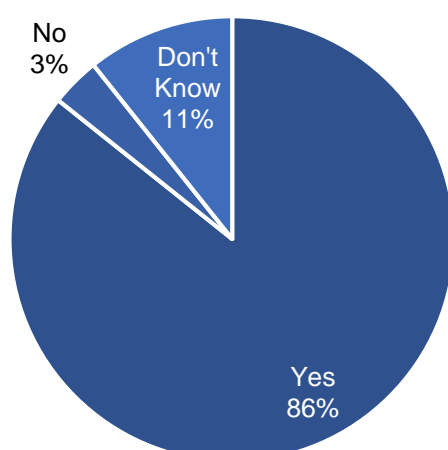


Other factors mentioned by LAs which influenced their decision-making process included budget and manpower constraints. The percentage of respondents giving each rating for each factor are shown above. Please see Appendix 5 Survey methodology for a description of statistical methods used.

Each local authority was asked if they had plans to reduce the amount of herbicide applied in the future and, if so, how they intended to do so. Twenty-four (86 per cent) replied yes, only one replied no and a further three stated they did not know (Figure 10). The main methods LAs intend to implement to reduce the use of herbicides included a continuation and expansion of the reduction strategies already in place (as reported in Figure 8), and mainly focussed on further reduction of the number of applications and the area sprayed, as well as increasing the use of non-chemical control. Several LAs stated they were currently exploring and trialling alternative methods of control and incorporating integrated weed management into future planning projects.

Three of the LAs commented that they had banned or restricted the use of glyphosate on certain surfaces in 2019/20 (during or after our data collection period). One further LA stated that they were currently reviewing their future use of glyphosate.

Figure 10 Intention of Local Authorities to reduce herbicide use in the future



Herbicide application operatives, training and record keeping

In 14 LAs, herbicides were applied solely by LA staff; in one LA, applications were applied by a contractor, and in 13 LAs, herbicides were applied by both LA staff and contractors. In relation to training for pesticide operators, 27 LAs (100 per cent) stated that a PA1 (safe handling and application of pesticides) and 25 (93 per cent) stated that a PA6 (safe use of hand held applicators such as knapsacks and hand-held lances) were the basic level of qualification required by their operators. A further 15 (56 per cent) said a PA2 (boom sprayers) was required by some staff to allow them to apply herbicides by mounted boom sprayers. Only three LAs reported that a BASIS qualification was required as a basic level of training for some staff e.g. pesticide store operatives. However, 21 LAs (78 per cent) stated that BASIS qualified staff were used to advise on herbicide use.

Eight of the responding LAs (30 per cent) stated that they kept records of how effective herbicide control measure had been.

Appendix 1 – Results tables

Table 1 Weed prevention methods used by Scottish LAs in 2019

Weed prevention method	No. of LAs	% of respondents
Mulching	26	93
Replacing annual flower beds with perennial beds to reduce maintenance input	22	79
Identifying/mapping of priority areas requiring weed control to target control effort	10	36
Resurfacing (e.g. replacing slabs with asphalt to reduce the need for weed control)	9	32
Drainage or soil aeration	3	11
Use of any weed prevention method	27	96

Note: this table includes data from 28 Scottish LAs representing 89 and 93 per cent of Scotland's land area and population respectively.

Table 2 Mean ranking of non-herbicide weed control measures used by Scottish LAs in 2019

Control method	Mean
Cutting, strimming, flailing, mowing	1.51
Hand weeding	2.36
Mechanical weeding (e.g. weed brushing or ripping)	2.99
Mulches	5.55
Hot foam, hot water/steam	5.82
Acid	5.90
Other	5.92
Flame/infrared weed burner	5.94

“Other” included creation of wildflower areas to reduce the need for weed control. No LAs reported using electrocution, grazing or biological control to control weeds. Please note for the rank, the lower the number the more commonly the method is used. Please see Appendix 5 Survey methodology for a description of statistical methods used. This table includes data from 28 Scottish LAs representing 89 and 93 per cent of Scotland's land area and population respectively.

Table 3 Mean ranking of reasons Scottish LAs used non-herbicide control measures in 2019

Reasons	Mean
Environmental concern	2.70
Reduced operator/public exposure to herbicides	2.88
LA policy to reduce herbicide use	3.11
Public perception of spraying herbicides	3.48
Reduction of risk to water bodies	3.68
Other	5.15

“Other” included where herbicide control was not possible and hand weeding was the only option, e.g. in shrub beds where herbicide use would damage ornamental planting. Please note for the rank, the lower the number the more important the reason. Please see Appendix 5 Survey methodology for a description of statistical methods used. This table includes data from 28 Scottish LAs representing 89 and 93 per cent of Scotland’s land area and population respectively.

Table 4 Herbicide formulations used by Scottish LAs in 2019

Weight of herbicide applied (kg), expressed as formulations (combination of active substances) and products (active substances and co-formulants).

Formulation	Formulation weight		Product weight
	kg	% of total use	kg
2,4-D	30	0.20	60
2,4-D/dicamba/fluroxypyr	24	0.16	54
2,4-D/dicamba/MCPA/mecoprop-P	4	0.03	20
2,4-D/florasulam	14	0.09	45
2,4-D/glyphosate	8	0.05	20
Aminopyralid/triclopyr	41	0.27	312
Diflufenican/glyphosate	171	1.12	588
Flazasulfuron	32	0.21	129
Glyphosate	14,553	95.50	39,361
Glyphosate/sulfosulfuron	360	2.36	2,947
MCPA	2	0.01	3
Total	15,238		43,539

Note: this table includes reported herbicide use from 27 Scottish LAs representing 89 and 92 per cent of Scotland’s land area and population respectively.

Table 5 Herbicide active substances used by Scottish LAs in 2019

Weight applied (kg) and percentage of total use

Active substance	Weight (kg)	% of total use
Glyphosate	15,058	98.82
2,4-D	63	0.42
Triclopyr	37	0.25
Flazasulfuron	32	0.21
Diflufenican	24	0.15
Sulfosulfuron	7	0.04
Fluroxypyr	6	0.04
Aminopyralid	4	0.02
MCPA	3	0.02
Dicamba	3	0.02
Mecoprop-P	1	0.01
Florasulam	0.28	<0.01
All herbicides	15,238	

Note: this table includes reported herbicide use from 27 Scottish LAs representing 89 and 92 per cent of Scotland's land area and population respectively.

Table 6 Mean ranking of reasons Scottish LAs used herbicides in 2019

Reasons	Mean
Invasive weed control	2.20
Visual appearance	2.21
Protection of infrastructure	2.43
Health & Safety considerations	3.17

Please note for the rank, the lower the number the more important the reason. Please see Appendix 5 Survey methodology for a description of statistical methods used. This table includes data from 28 Scottish LAs representing 89 and 93 per cent of Scotland's land area and population respectively.

Table 7 Mean ranking of steps taken to minimise herbicide use by Scottish LAs in 2019

Steps taken to minimise herbicide use	Mean
Consider using minimum product rates or reducing area sprayed	2.20
Evaluate whether there are alternative methods of control available	2.29
Assess whether the financial loss, damage or visual effect caused by the weed outweigh the cost of the herbicide application	4.39
Use weed assessments/thresholds prior to herbicide application	5.02
Take advice from a professional agronomist/adviser	5.42
Other	5.42
Use of volunteer/community groups for manual removal of weeds	5.55
Use of mulch to suppress weeds	5.71

Please note for the rank, the lower the number the more commonly used the criteria. "Other" includes identification and continued roll out of controlled biodiversity areas, use of controlled droplet applicator and reduced frequency of street spraying. Please see Appendix 5 Survey methodology for a description of statistical methods used. This table includes data from 28 Scottish LAs representing 89 and 93 per cent of Scotland's land area and population respectively.

Table 8 Factors influencing Scottish local authority decisions to use herbicides rather than alternative control measures – 2019

Mean rating (where 1 equals little influence and 5 equals strong influence) and percentage rated strongly and weakly by respondents

Influencing factor	Mean	% with rating ≥ 4	% with rating ≤ 2
Herbicide treatment more effective than alternatives	4.56	96	0
Herbicide treatment has a longer lasting effect	4.26	86	0
Lower cost of herbicide control	4.15	75	0
Limited availability of alternative products or techniques	3.85	71	7
Herbicide treatment is the easiest method	3.46	50	18
Lack of information on alternative products or techniques	2.77	29	46
Herbicide treatment is more environmentally friendly	2.52	14	39
Always use herbicide treatments	2.33	11	46
Follow advice from consultant or contractor	2.02	14	57
Have not considered non-herbicide control	1.93	4	71

Other factors mentioned by LAs which influenced their decision-making process included budget and manpower constraints.

Please note the higher the mean rating the stronger the influence on the decision to use herbicides rather than non-chemical alternatives.

Please see Appendix 5 Survey methodology for a description of statistical methods used.

This table includes data from 28 Scottish LAs representing 89 and 93 per cent of Scotland's land area and population respectively.

Appendix 2 – Survey statistics

Table 9 Survey response rate

	No.	% total LAs	Total area (km ²)	% total area	Total population	% Total population
Scottish local authorities	32		77,911		5,463,300	
Herbicide data returns ⁽¹⁾⁽²⁾	27	84	69,419	89	5,002,730	92
Qualitative data returns ⁽¹⁾	28	88	69,593	89	5,098,260	93
No return	4	13	8,319	11	365,040	7

(1) Includes two LAs which provided a partial response representing greenspaces only.

(2) Includes two LAs who provided quantities of herbicide purchased rather than used.

Table 10 Scottish land area by administrative area⁽⁶⁾

Local Authority	Population	Area (km²)
Aberdeen City	228,670	186
Aberdeenshire	261,210	6,313
Angus	116,200	2,182
Argyll and Bute	85,870	6,909
City of Edinburgh	524,930	263
Clackmannanshire	51,540	159
Dumfries and Galloway	148,860	6,427
Dundee City	149,320	60
East Ayrshire	122,010	1,262
East Dunbartonshire	108,640	174
East Lothian	107,090	679
East Renfrewshire	95,530	174
Falkirk	160,890	297
Fife	373,550	1,325
Glasgow City	633,120	175
Highland	235,830	25,657
Inverclyde	77,800	160
Midlothian	92,460	354
Moray	95,820	2,238
Na h-Eileanan Siar	26,720	3,059
North Ayrshire	134,740	885
North Lanarkshire	341,370	470
Orkney Islands	22,270	989
Perth and Kinross	151,950	5,286
Renfrewshire	179,100	261
Scottish Borders	115,510	4,732
Shetland Islands	22,920	1,468
South Ayrshire	112,610	1,222
South Lanarkshire	320,530	1,772
Stirling	94,210	2,187
West Dunbartonshire	88,930	159
West Lothian	183,100	428
Scotland	5,463,300	77,911

Appendix 3 – Financial burden of LA weed control survey

In order to minimise the administrative burden on LA this survey was conducted by email with a follow up email if necessary.

To determine the total burden that the survey placed on those providing the information, respondents were asked to estimate the time taken to provide the data requested.

Of the 28 LAs who provided information, 20 provided information about how long was spent on the data request.

The median time local authorities took to provide the information was 2 hours.

The following formula was used to estimate the total cost of participating:

Burden (£) = No. surveyed x median time taken (hours) x typical hourly rate*

(* using median “Full Time Gross” hourly pay for Scotland of £15.52⁽⁷⁾)

The estimated total financial burden, accounting for all local authorities’ participation in the 2019 weed control survey, was £869.

Appendix 4 – Definitions and notes

1) '**Pesticide**' is used throughout this report to include commercial formulations containing active substances (a.s.) used as herbicides. A pesticide **product** consists of one or more active substances co-formulated with other materials.

2) An **active substance** (or active ingredient) is any substance or micro-organism which has a general or specific action: against harmful organisms; or on plants, parts of plants or plant products.

3) In this report the term '**formulation(s)**' is used to describe the pesticide active substance or mixture of active substances in a product(s). It does not refer to any of the solvents, pH modifiers or adjuvants also contained within a product that contribute to its efficacy.

4) A **herbicide** is a pesticide used to control unwanted vegetation (weed killer).

5) Due to rounding, there may be slight differences in totals both within and between tables.

6) **Integrated weed management** (IWM) is a weed management program based on a combination of preventative, cultural, mechanical and chemical practices.

Appendix 5 – Survey methodology

Sampling and data collection

There are 32 local authorities in Scotland (Figure 11, Table 10). Each LA was emailed a survey questionnaire designed to collect information about weed control strategies used in 2019 (a copy of the survey questionnaire is available in Appendix 6). The survey was due to commence in March 2020 but was delayed due to the COVID-19 pandemic. Questionnaires were emailed in September 2020. Where data were not received, reminder emails were sent two months after survey initiation. Data collection was closed in January 2021.

The questionnaire consisted of two parts. The first was a qualitative section consisting of questions about integrated weed management practices, including weed prevention and non-herbicide methods of control. The second was a quantitative questionnaire to collect information about herbicide applications used by the LA during 2019.

The intention of this voluntary survey was to attempt to collect information from all Scottish LAs. Therefore, unlike the Scottish Government's agricultural pesticide usage surveys, no attempt has been made to produce a statistical estimate of total Scottish use from this sample. However, as the sample covers 88 per cent of Scottish LAs, it is considered to provide a robust overview of their integrated weed management practices.

The questionnaire was emailed to local authority staff who had responsibility for weed control. Weed control and/or integrated management is often the responsibility of more than one department. LA contacts were asked to share the questionnaire with the most appropriate person in each department to avoid gaining only partial information. Survey respondents were asked to describe their role within the organisation. Twenty-three indicated they organise and supervise those responsible for carrying out weed control operations. Thirteen respondents were also involved in drawing up tenders and agreements for those responsible for weed control, four stated they organise, supervise and get involved with weed control and finally one said they were responsible for carrying out weed control operations. Three respondents did not provide any data about their role within their LA.

Statistical Methods

Statistical analysis was provided by Biomathematics and Statistics Scotland. For a number of questions, respondents were presented with a list of possible options and were asked to rank them in terms of relevance for their operations (where "1" denoted the most relevant). If any respondent adopted an unlisted approach or reason, they were asked to state these in the "Other" box and give an associated rank.

Presented ranks were adjusted for any ties within each LA prior to statistical analysis. Unranked options were interpreted as being of no relevance to the respondent and hence ranked as of least importance. All unranked options were regarded as tied unless not cited by any LA at all, in which case they

were excluded from calculation of ranks. The importance of assigning a rank (albeit a rank denoting least importance) to options unranked within individual LAs should be noted. If ranks were not assigned in such cases, then it would be possible for an approach to be ranked of high relevance simply because it was ranked of high relevance in the few occasions it was selected by respondents. In cases where respondents cited an approach in the “other” category but failed to rank it, it has been ranked of less relevance than all those ranked listed categories but above all the unranked listed categories. In cases where multiple respondents stated similar approaches in the “other” category, they have been combined into a new, additional, specified approach. Where amalgamation has not been possible, they have simply been classified as “other”.

As an example, consider a scenario with five approaches listed and in which a respondent ranked two approaches as “1”, one approach as “2” and did not rank the remaining two approaches. The two approaches ranked “1” would be given a rank of 1.5 (sharing the average of 1 and 2). The approach ranked “2” on the form would be ranked “3” behind the two ranked above it. The two unranked options would be ranked 4.5 (sharing the average of ranks 4 and 5).

For each of these questions the mean ranks for each category have been computed as summary statistics. Irrespective of size, the responses from each local authority have been given equal weighting (i.e. treated as of equal importance).

For the one local authority supplying three questionnaires the same ranking methodology has been applied to each questionnaire and then the mean over the three questionnaires has been used to represent that local authority. For the two local authorities that restricted their answers to green spaces, it has been assumed that they would have given similar answers if they had covered all areas of use in their response.

In contrast, in one question (factors influencing decision to use herbicide rather than non-herbicide alternatives) respondents were asked how strongly a series of factors influenced their decision making on a (1 to 5) scale (1 equals little influence and 5 equals strong influence) rather than to rank the listed factors. The option was also given to record any other unlisted factors and provide a score. For this question the scores for each factor have been analysed separately. The scores are assumed to be on an interval scale. That is to say that each increment in the (1 to 5) scoring scale is assumed to correspond to a similar increase in influence. For any given respondent it is assumed they use the scoring scale in the same way for each factor. These two assumptions enable informal comparisons between factors of mean scores calculated across respondents to be meaningful. However, it is recognised that there are likely to be respondent-to-respondent differences in how each defines points on the (1 to 5) scale and therefore how it is used. What one respondent may regard as a fairly strong influence, another respondent may regard as a very strong influence.

Data quality assurance

The dataset underwent several validation processes as follows; (i) checking for any obvious errors upon data receipt (ii) checking and identifying inconsistencies with use and approval conditions once entered into the database (iii) 100 per cent checking of data held in the database against the raw data. Where inconsistencies were found these were checked against the records and with the LA if necessary. Additional quality assurance is provided by sending reports for independent review. In addition, the Scottish pesticide survey unit is accredited to ISO 9001:2015. All survey related processes are documented in Standard Operating Procedures (SOPs) and our output is audited against these SOPs by internal auditors annually and by external auditors every three years.

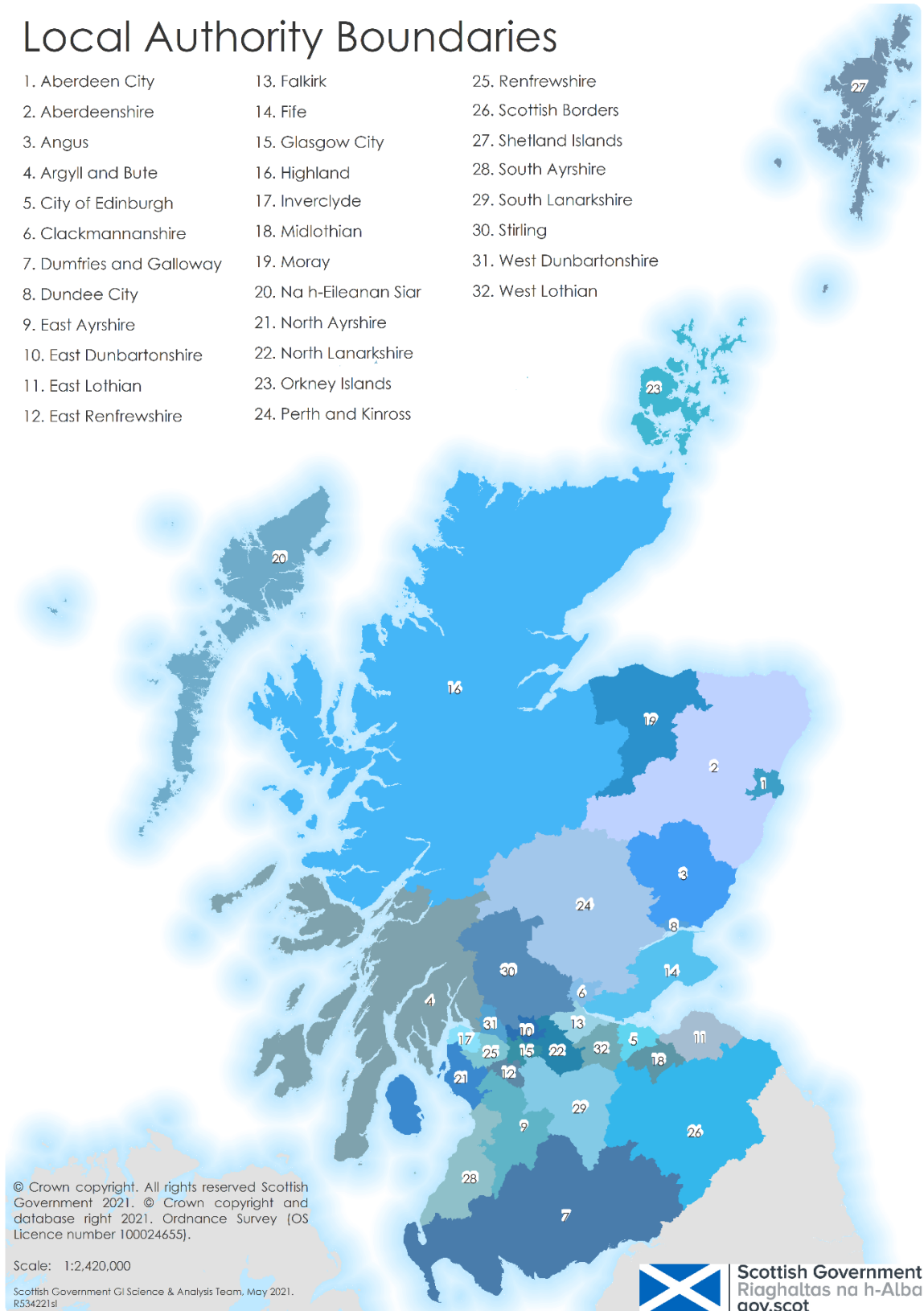
Main sources of bias

These surveys may be subject to measurement bias as they are reliant on respondents recording data accurately. As this survey is not compulsory it may also be subject to non-response bias, as some LAs could be more likely to respond to the survey than others.

Figure 11 Scottish local authority boundaries

Local Authority Boundaries

- | | | |
|--------------------------|------------------------|-------------------------|
| 1. Aberdeen City | 13. Falkirk | 25. Renfrewshire |
| 2. Aberdeenshire | 14. Fife | 26. Scottish Borders |
| 3. Angus | 15. Glasgow City | 27. Shetland Islands |
| 4. Argyll and Bute | 16. Highland | 28. South Ayrshire |
| 5. City of Edinburgh | 17. Inverclyde | 29. South Lanarkshire |
| 6. Clackmannanshire | 18. Midlothian | 30. Stirling |
| 7. Dumfries and Galloway | 19. Moray | 31. West Dunbartonshire |
| 8. Dundee City | 20. Na h-Eileanan Siar | 32. West Lothian |
| 9. East Ayrshire | 21. North Ayrshire | |
| 10. East Dunbartonshire | 22. North Lanarkshire | |
| 11. East Lothian | 23. Orkney Islands | |
| 12. East Renfrewshire | 24. Perth and Kinross | |





SG Local Authority weed control survey – Integrated and Herbicide Control Measures 2019

Section A - Local Authority Operational Details

Local Authority

- | | Yes | No | Don't know |
|--|--------------------------|--------------------------|--------------------------|
| 1. Is your Local Authority, or those responsible for weed control on your behalf, a member of the following industry associations or schemes? | | | |
| Amenity Forum | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Amenity Assured | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| PCA Invasive Weed Code | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Is your Local Authority aware of the new UK Amenity Standard (launched Feb. 2020)? | <input type="checkbox"/> | <input type="checkbox"/> | |
| 3. If yes, will your Local Authority require its own personnel or those responsible for weed control on your behalf, to be compliant with the UK Amenity Standard? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Section B - Integrated Weed Management Practices

An integrated approach uses both herbicide and non-herbicide techniques to suppress weeds.

In answering the following questions, are you referring to all weed management across the whole of the local authority, or just the Highways/footpaths, or just the parks, gardens and other green spaces? (Whole of LA) (Highways, footpaths only) (parks, gardens, green spaces only)

Please ensure a copy of this questionnaire is sent to an appropriate person in each department to ensure we collect weed management information for the whole of your Local Authority.

- | | Yes | No |
|---|--------------------------|--------------------------|
| 4. Does your Local Authority use any non-herbicide methods for weed control? | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Does your Local Authority have a policy about the integrated control of weeds? | <input type="checkbox"/> | <input type="checkbox"/> |
| If yes, would you be willing to share this policy with us? | <input type="checkbox"/> | <input type="checkbox"/> |
| If yes, please provide a link below or email a copy to us along with your survey response - | | |

6. Does your Local Authority have a formal Integrated Weed Management Plan?
- If yes, would you be willing to share this plan with us?
- If yes, please provide a link below or email a copy to us along with your survey response -

7. Are you aware of the [Defra Best Practice Guidance](#) for integrated and non-chemical amenity hard surface weed control?

Yes No

8. Are you aware of the Amenity Forum Integrated Weed Management Guidance and Template for creating an Integrated Weed Management Plan?

9. Please indicate how often the possibility of using non-herbicide methods for vegetation control (*such as those listed below*) is considered before a decision to use herbicides is made:

Always Sometimes Never

10. From the following list of non-herbicide approaches, please indicate the options used by your organisation, or by a contractor on your behalf, during 2019 (please select all that apply and rank these with **1** being the most commonly used method)

- | | | | |
|-------------------------------|--------------------------------------|-------------------------------|--|
| <input type="checkbox"/> rank | Hand weeding | <input type="checkbox"/> rank | Mechanical weeding eg weed brushing or ripping |
| <input type="checkbox"/> rank | Cutting, strimming, flailing, mowing | <input type="checkbox"/> rank | Grazing |
| <input type="checkbox"/> rank | Hot foam or hot water/ steam | <input type="checkbox"/> rank | Flame/infrared weed burner |
| <input type="checkbox"/> rank | Acid | <input type="checkbox"/> rank | Biological control/Biopesticides |
| <input type="checkbox"/> rank | Electrocution | | |

Please record below (and rank) any other non-herbicide weed control methods you use:

11. Do you assess how effective these control measures have been?

Yes No

12. If non-herbicide methods of control are used please indicate below the main reasons for their use (select all that apply and rank these in order of importance, with **1** being the most important):

- rank Public perception of spraying herbicides
- rank Reduced operator/public exposure to herbicides
- rank Environmental concern

- rank Reduction of risk to water bodies
 - rank Local authority policy to reduce herbicide use
- Other (please specify and rank below)

13 Does your local authority use other methods to reduce the need for weed control i.e. weed prevention? Yes No

If yes, please indicate which methods you use (*select all that apply*):

- Resurfacing (e.g. use of asphalt instead of slab reducing need for weed control)
- Mulching
- Identifying/mapping of priority areas requiring weed control to target control effort
- Replacing annual flower beds with perennial beds to reduce maintenance input requirements
- Drainage or soil aeration

Other (please specify below)

Section C - Pesticide Use

14 Does your Local Authority use herbicides? Yes No
 If **no**, please go to section [D](#). If **yes**, please answer the questions below

Please indicate below the reasons for your Local Authority's use of herbicides (select all that apply and rank these in order of importance, with **1** being the most important):

- rank Invasive weed control
- rank Visual appearance
- rank Protection of infrastructure
- rank Health and safety considerations

Other (please specify and rank below)

15 Does your Local Authority take steps to minimise the use of herbicides? Yes No

If yes, which criteria does your Local Authority use when taking steps to minimise the use of herbicides? (please select all that apply and rank these with **1** being the most commonly used criteria):

- rank Use weed assessments/thresholds prior to herbicide application
- rank Evaluate whether there are alternative methods of control available
- rank Take advice from a professional agronomist/advisor

- rank Assess whether the financial loss, damage or visual effect caused by the weed outweigh the cost of the herbicide application
- rank Consider using the minimum product rates or reducing the area sprayed

Please record below (and rank) any other steps you take to minimise your use of herbicides:

- 16 Please indicate the degree to which the factors listed below have influenced your organisation's decision to use herbicides rather than non-herbicides alternatives (please select the most relevant number for each factor where **1 shows little influence** and **5 shows strong influence**)

	Little influence			Strong influence	
	1	2	3	4	5
Herbicide treatment more effective than alternatives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lower cost of herbicide control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Herbicide treatment has a longer lasting effect	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Herbicide treatment is the easiest method	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Always used herbicide treatments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have not considered non-herbicide control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Herbicide treatment is more environmentally friendly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Follow advice from consultant or contractor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Limited availability of alternative products or techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of information on alternatives products or techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please record below (and rank) any other factors influencing your decision making:

- 17 Are herbicides applied by Local Authority staff or by contractor?

LA staff Contractor Both

- 18 What is the basic level of training for pesticide operators?

(eg PA1, PA2, PA3, PA4, PA6, Basis qualified, NRoSO members etc) please specify:

- 19 Are BASIS qualified staff used to advise on herbicide use?

Yes No Don't know

- 20 Do you keep records of how effective herbicide control measures have been?

21 Does your Local Authority have plans to reduce the amount of herbicides applied in the future?

If yes, please outline below how your organisation intends to achieve this?

Please record your herbicide usage for 2019 on the pages overleaf. Please record the surface types and method of application and total quantity of each product in 2019. Alternatively, you can provide records of individual applications by date.

Please note – we realise that it may be time consuming to provide the data in the required format. If it is easier to provide data in a different format, then please do so. We will then collate it into our categories on your behalf. If you have any comments or queries about the survey, please contact us on psu@sasa.gov.scot.

Form Completion Notes

- Date : Please record either the actual date or record 'total' if you are recording the total quantity of a product used in 2019
- Surface type and Method of application : Please select the most appropriate option from the drop-down lists or select other and specify the surface type or method of application
- Product : Please record the full product name complete with prefixes and suffixes
- Total quantity/ Application rate used : Please complete the total quantity used in 2019 (Litres or Kg) column or alternatively complete the application rate per unit area column for a specified date
- Area treated : Please record the total area treated and select the appropriate units
- Reason for use : Where possible please record the reason for use – use NK if this is unknown

If it is not possible to record each individual application, please select the surface types and methods of application (**Key below**) and total quantity of each product used in 2019.

KEY	SURFACE TYPES	METHOD OF APPLICATION
	AG Amenity Grass/parks	CD Controlled droplet applicator
	CA Canals	GL Herbicide glove
	CP Car Parks	GU Spray gun
	FW Forestry/Woodland	IN Stem injection
	GO Golf Course	KN Lever operated/pressurised knapsack
	GR Bowling Greens	MK Motorised knapsack
	GV Gravel	VB Vehicle mounted boom sprayer
	IV Invasive species	VL Vehicle mounted lance
	PG Playgrounds	WC Watering can
	PI Pitches/Sports Turf	WW Weed wiper
	PK Pavements/Kerbs/Paths	OT Other (please specify)
	RI Riparian	
	RO Roads	
	TS Trees/Shrubs	
	WA Open Water	
	OT Other (please specify)	

Date	Surface Type	Product	Method of application	Total Quantity used (L or KG)	Application Rate per unit area (ha or m ²)	Area treated (ha or m ²)	Reason for use
	Select		Select	units	units	units	
	Select		Select	units	units	units	
	Select		Select	units	units	units	
	Select		Select	units	units	units	
	Select		Select	units	units	units	
	Select		Select	units	units	units	
	Select		Select	units	units	units	
	Select		Select	units	units	units	
	Select		Select	units	units	units	
	Select		Select	units	units	units	
	Select		Select	units	units	units	
	Select		Select	units	units	units	

Section D – Other Information

Could you please estimate how long it took you to complete this form?

hours

Would you like to receive notification when the report is published?

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Please enter your contact details below:

Name:

Job Title:

Email address:

Phone number:

Please describe your role within the organisation (select all that apply)

- Involvement in drawing up tenders & agreements for those responsible for weed control
- Organise and supervise those responsible for carrying out weed control operations
- Organise, supervise and get involved with weed control (which may include making herbicide applications)
- Responsible for carrying out weed control operations (which may involve making herbicide applications)

If you have any comments or queries about the survey, please contact us on psu@sasa.gov.scot

Many thanks for your participation.

If you have any comments relating to any aspect of this survey or your weed control activities, please record these below.

Acknowledgements

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How to access background or source data

The data collected for this statistical publication:

are available in more detail through Scottish Neighbourhood Statistics

are available via an alternative route

may be made available on request, subject to consideration of legal and ethical factors. Please contact psu@sasa.gov.scot for further information.

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