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JRC VALIDATED METHODS, REFERENCE METHODS AND MEASUREMENTS REPORT



Technical guidance on the pro rata system
for permanent grassland

*Assessing pro rata eligibility
and establishing the maximum eligible area
for permanent grasslands with scattered ineligible features*

2 Frontpage2 LPIS pro rata

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Abstract

This technical guidance offers the data specification to assess the pro rata value for the eligibility of permanent grassland with scattered ineligible features. It involves a systematic approach to be used during LPIS creation and upkeep processes and a sporadic approach to be used in absence of delineation instruments. The systematic approach involves delineating permanent grassland land cover classes with a known and reliable distribution of their scattered ineligible features. For each land cover class, the pro rata category is precisely determined and with it, the class' eligibility rate. The reference area for all reference parcels with such land cover class is calculated by summing up all the contributing land cover classes inside their perimeter. The sporadic approach assesses the grassland percentage directly on a (reference or agricultural) parcel. The result is reclassified into one of the two pro rata categories and used to calculate the maximum eligible area. Both approaches require a reliable and precise assessment of the profusion of grass and herbaceous fodder. This inevitably must be customized to meet the local needs and conditions and both the assessment method and its individual application must be documented.

3 LPIS TG PR

This article is the starting page of **the LPIS pro rata guidance**. It offers two methodologies to determine the value of MEA of reference parcels holding PG with scattered ineligible features:

- The systematic method relies on the delineation of the PGs with scattered ineligible features as a clearly defined, well specified land cover class. It implies that the land cover class borders itself can be delineated but the scattered ineligible features within can't. A generic reduction coefficient can be determined for each such class and contribute to all reference parcels wherein that class occurs.
- The sporadic method uses any other methodology than delineation to directly assess the proportion of grassland in the reference or agricultural parcel.

You can print [this technical guidance](#) on the fly.

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4 PR Overview

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4.1 Background

- This document provides technical guidance for the creation and processing of reference parcels that hold PG with scattered ineligible features and the accompanying pro rata system (Art.10 of [Commission Delegated Regulation \(EU\) No 640/2014](#)). It complements the guidelines on the Land Parcel Identification System (LPIS) provided by DG Agri (document DSCG/2014/33).
- As the technical guidance focuses on one or more values in the databases that form the Integrated Administration and Control System (IACS), its structure is derived from the standard ISO 19131:2007(E) ?Geographic information - Data product specifications?. This standard is used for all technical guidance issued for Directive 2007/2/EC (INSPIRE). As, only the relevant chapters of the data product specification outline are kept in this document, it does not aspire to comply with the standard.

4.2 Terms and definitions

- Maximum eligible area (MEA): the number of potentially eligible hectares under a particular aid scheme or support measure. In LPIS context, the MEA is, among other factors, capped by the reference area of the reference parcel.
- Geometric area of the reference parcel: area obtained by delineation of the agricultural land cover (including landscape features that are protected under GAEC 7) and landscape features that are traditionally part of good agriculture cropping or utilization practices.
- Reference area: area of the reference parcel that represents its default value of potentially eligible hectares under a particular aid scheme or support measure. It is recovered from the geometric area, possibly, after application of an eligibility rate.
- Pro rata method: approach to reduce by means of a forfeit the reference area according to an eligibility rate.
- Reduction coefficient: value, in per cent, that quantifies the proportion of inherent ineligible elements inside the grassland. This reduction coefficient is being referred to in Art.10 of [Commission Delegated Regulation \(EU\) No 640/2014](#) and should therefore not be mistaken for the reduction coefficient referred to in Art.32(5) of Regulation (EU) No 1307/2014 and Art.8 of [Commission Delegated Regulation \(EU\) No 639/2014](#).
- Eligibility rate: proportion of accounted grass or other herbaceous forage or species that can be grazed.

4.3 Abbreviations;

- **CwRS**: control with remote sensing
- **GSD**: ground sample distance
- **IACS**: integrated administration and control system
- **LC**: land cover
- **LPIS**: land parcel identification system
- **MEA**: maximum eligible area
- **OTSC**: on the spot check
- **PG**: permanent grassland
- **RC**: reduction coefficient
- **RP**: reference parcel
- **RMSExy**: two-directional root mean square error
- **VHR**: very high resolution

4.4 Description

- This data specification focuses on the methodologies to determine the value of MEA of reference parcels holding PG with scattered ineligible features. There are essentially two methods, a systematic one and a sporadic one.
 - ◊ The systematic method relies on the delineation of the PGs with scattered ineligible features as a clearly defined, well specified land cover classes. It implies that the land cover class borders itself can be delineated but the scattered ineligible features within cannot. Under these conditions, a generic reduction coefficient can be assessed **and determined** for each class and contribute to all reference parcels wherein that class occurs.
 - ◊ The sporadic method uses any other methodology than delineation to directly assess the resulting MEA of the reference or agricultural parcel.
- The sporadic approach offers simplicity, flexibility and practicality. For a territorial inventory such as LPIS-upgrading, this sporadic approach should be used in conditions where the systematic method is not feasible: e.g. for cases where the latter harms accountability and scalability and for observations in absence of suitable delineation conditions. Please note that on-the-spot checks to be done on declared pro rata parcels for which the MEA is established based upon the sporadic method always require an actual field visit (i.e. classical on-the-spot check **or, when appropriate for the methodology, rapid field visit**).

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5 PR Specification scope

- This specification relates to PG with scattered ineligible features registered in the LPIS as of 2015. These grassland are lands that:
 - ◊ either became newly eligible for any area-related aid scheme or support measure. These PG have to be delineated and assessed to be brought into the LPIS;
 - ◊ or have been subject to an earlier forfeit reduction of eligible hectares and are already recorded in the LPIS. Existing reference parcels that hold such PG can be subject to revision.
- This specification does not apply to PG which is fully eligible, arable land or land under a permanent crop.
- This specification does not address the issue of eligibility of landscape features scattered within the grassland.

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6 PR Data product Identification

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6.1 Purpose

- PG with scattered ineligible features are inherently risky in maximum eligible area terms as the very scattering imposes mapping challenges. This technical guidance proposes a systematic methodology that reduces the risk of a biased MEA value and that provides for simplification, accountability and precision.
- The guidance sets out a dual framework wherein, pending on the parcel conditions, either one of two methodologies can be applied:
 1. a systematic methodology is appropriate when the deduction of the scattered features can be determined based on known characteristics of well identified land cover classes.
 2. a sporadic methodology is appropriate for conditions where only an individual, direct assessment of the proportion of grass is available.

6.2 Spatial resolution

- IACS and The LPIS operate on a nominal scale of 1:5.000 and require a 0,01 ha area value precision. **Practical considerations and technical recommendations for the implementation of this requirement are given in relevant guidance documents of DG AGRI (DSCG/2014/33) and DG JRC (DS-CDP-2015-10).**
- LPIS reference area should delineate the agricultural land cover in view of **the above provisions**; an exception may be made for isolated agricultural plots that are smaller than the minimum size set by the MS for an agricultural parcel, if applicable.
- The minimum mapping units for subsequent exclusion by delineation from the reference area by group of land cover classes, **are as follows** :
 - ◊ artificial features **that seal the soil surface** (constructions, roads) : no minimum size applies and the feature must be mapped out.
 - ◊ non-agricultural land **(i.e. single patches or clusters of non-agricultural land), that can neither be taken up by any agriculture activity (incl. grassland that is inaccessible for grazing) nor be considered part of the local established practices of the region: according to local LPIS RP specifications, not larger than 0,05 ha (500 m2) as specified in DSCG/2014/33.**
- The above conditions provide a rough indication of the maximum size of a single scattered feature; Assuming 4 features in a cluster, the average feature should remain below circa **0,0125** ha.

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7 PR Data content and structure

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The following illustrations show the relevant application schemas for the systematic methodology (RP and association with different LC classes) and for the sporadic methodology (both RP and AP).

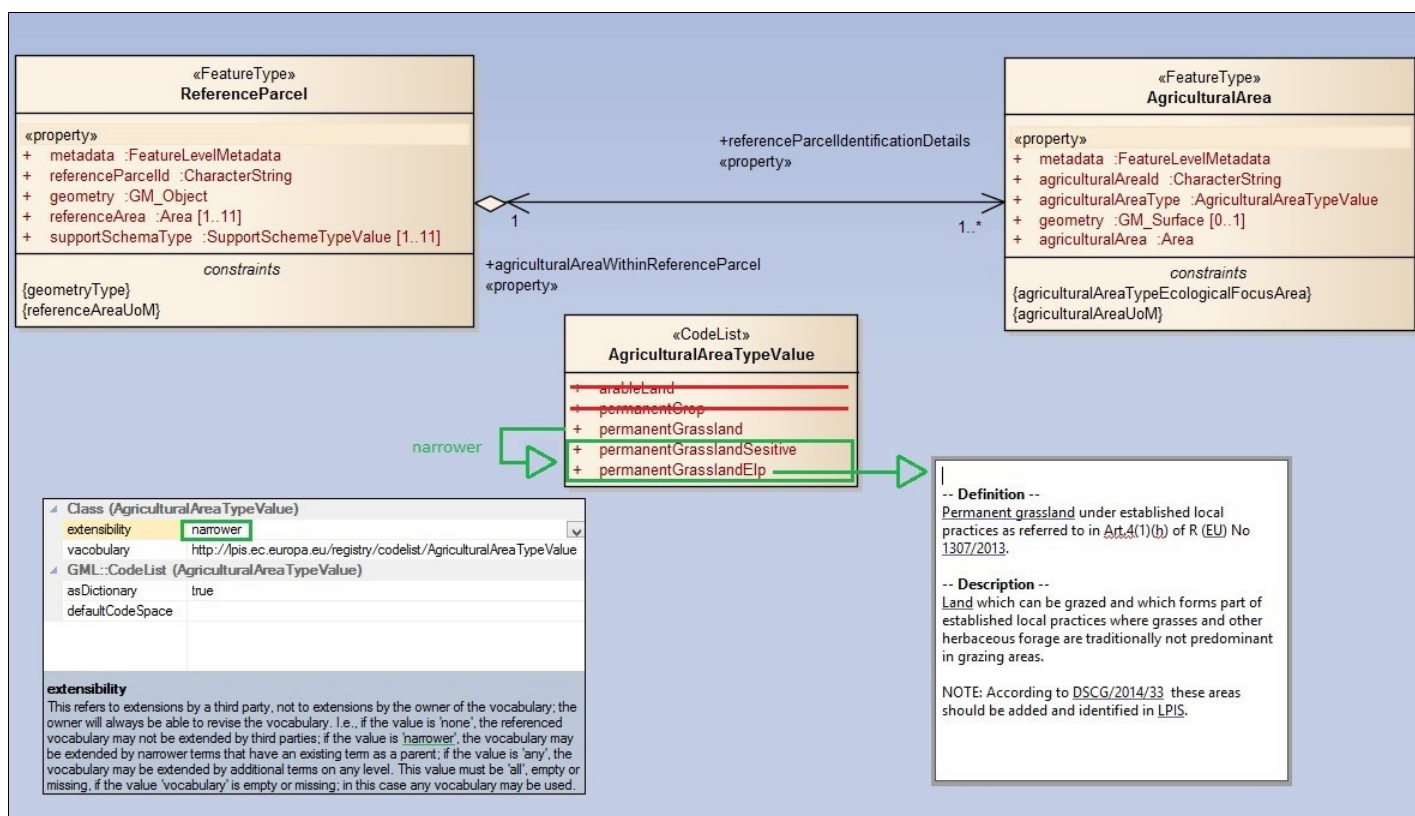


Figure 1: database elements relevant for the systematic methodology: reference area (RP) and agricultural area type value.

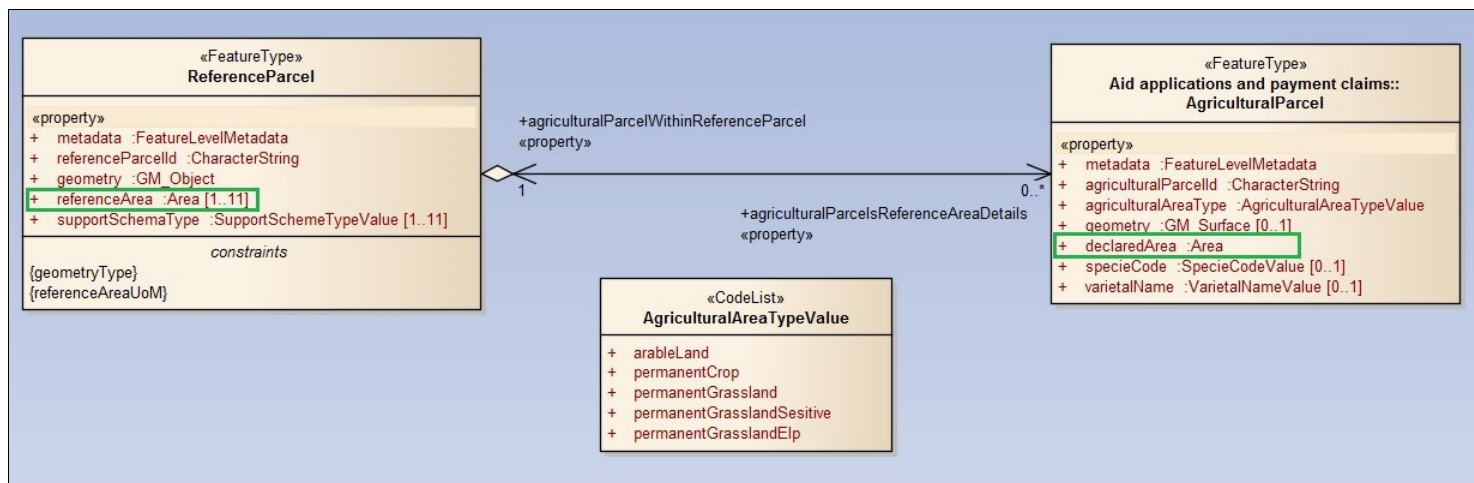


Figure 2: database elements relevant for the sporadic methodology: reference area (for RP) and the measured area based on the declared area (for agricultural parcel)

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8 PR Aerial imagery sources

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- For the inventory and MEA-assessment of pro rata grasslands, aerial imagery is a commonly used source data set. It can be complemented or substituted with VHR satellite imagery that meets the same specifications. We should prescribe what is needed as described below.
- All imagery should have spatial resolution compliant with cartographic scale of 1:5.000 or better. - This translates into a positional accuracy requirement lower than 1,25 m RMSE_{xy} and a GSD/pixel size below 50-70cm depending on the sensor. Viewing angles should be appropriate for the landscape.
- The objective is to quantify the proportion of eligible land cover (grass including its forage shrubs and eligible landscape features) by excluding both the ineligible vegetation (trees, gorse,?) and non-vegetative land cover elements (rocks, water, substrate,?) that are scattered throughout the grassland. The local conditions will dictate whether panchromatic, multispectral, SAR or even thermal **or SAR** imagery is most suitable and it is essential to adhere to that choice. See the chapter on processes for further criteria for the selection of image radiometry.
- Similar considerations about the suitability of the source images apply to their acquisition date of the source image, as it is essential in LPIS-terms that PG can be unambiguously delineated. The phenology differences between the grass and the ineligible features may peak outside the agricultural growing season allowing best identification and delineation at such times. In such cases, if there is a different image for the on-the-spot check (remote sensing), particular attention should be paid. The differences between the images should be carefully assessed and there should be a rapid field visit to visually confirm the recorded extent of the pro rata land cover (in LPIS) rather than delineating new polygons..
- LPIS deals with spatial features that are stable in time. The use of multiannual series of imagery is essential to reliably distinguish the pro rata PG that represents a stable agricultural land from grassland where the scattered ineligible features are a fast-growing encroachment after abandonment. Whereas the former PG is in the scope of this specification, the latter ?grassland? is deprived of agricultural activity and therefore not in scope. Ensure historic images are at hand to make the distinction where necessary.
- Ancillary data and image sources from different dates and with different specifications may be required to perform and confirm the RC assessment on a sample of the grasslands.

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9 PR Eligibility profile

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- The eligibility profile is the application schema of the LPIS custodian that describes the land cover classes which are considered as eligible for payment for a given area-related aid scheme or support measure. The introduction of pro rata grasslands requires that suitable entries of land cover types (classes) are introduced in the eligibility profile.
- The objective of any pro rata methodology is to obtain a number to quantify the proportional profusion of grass or species that can be grazed, as predefined by the regulatory framework. However, the systematic method, as used for LPIS capture, works through an intermediate class-specific reduction coefficient. For the sake of clarity: this is different from the sporadic, parcel-specific assessment where only the abundance of grass would be considered.
- To define a pro rata class for the eligibility profile, several criteria must be considered and addressed:
 - ◊ what is the physical reality on the ground, or better, what is the precise nature of the scattered non-eligible features?
 - ◊ how can PG of that land cover class be distinguished from other grasslands? Some parameters could be scattering pattern, scattering density, phenology, topography, location: i.e. any photointerpretation or observation context on top of the normal spectral signature.
 - ◊ what spatial characteristic of the class is both visible and stable in time? These are prime candidates for the delineation and on-the-spot check observations. Some class properties could be edaphic (soil conditions) or topographic (slope, hilltop location) and may drive the time of the image acquisition and required consultation of ancillary data.
 - ◊ if the class is not the result of such physical constraint but of a typical particular agricultural land use, how can the presence of such practice be evidenced? What is the ancillary information that can be provided by the farmer?
 - ◊ does the class exhibit a regional variation or trend? How can it be accommodated?
 - ◊ since most of the traditional fully eligible grasslands are already in the LPIS, consider the recovery of delineation instructions for these complementary classes where possible.
- Use the findings of the above criteria to evaluate whether you are using the optimal sources for pro rata data capture. Refine your findings with the experiences gained while setting a class reduction coefficient.
- Use these finding for semantic definition and detailed description of pro rata classes. It is highly recommended to annex imagery illustrations that can serve as keys for visual photo interpretation or training data for automatic classification.
- Share the findings and documentation with farmers, LPIS operators and OTSC inspectors.

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10 PR Assessing class reduction coefficient

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- The systematic method relies on assessment of the eligible part of the grassland by deducting the ineligible parts. For this, the pro rata grassland land cover polygon is delineated and its full area is proportionally reduced based by a coefficient. To allow such approach, the coefficient must be unbiased and precise and this, in turn, strongly depends on how well the above criteria apply to the land cover class.
 - ◊ Precision is only possible if the land cover class definition itself is precise in terms of the scattered ineligible features. Their identifiable nature and predictable scattering are a prerequisite for the extrapolation of a reduction coefficient over larger territories.
 - ◊ Absence of bias can be best achieved by determining the abundance of the grass at the optimal timing. This optimal timing depends on the agricultural activity and/or the method to assess the reduction coefficient. This is not necessarily the same time of the source imagery which should allow for the optimal delineation of the land cover polygon borders.
- A RC assessment has to be performed on a representative (i.e. random) sample of the targeted PG land cover classes; a sample of 30 field occurrences should be sufficient to start. Verify the representativeness after producing the first assessment results.
- Strictly adhering to the delineation instruction of the pro rata grassland class, a single polygon of each occurrence has to be delineated, 30 representative polygons in total. Such land cover polygon boundaries not necessarily follow reference parcel perimeters. Although the following steps may require more detailed data (e.g. imagery of better GSD, additional field surveys), ensure that the delineation corresponds to what is normally created for LPIS purposes even if done on the detailed data.
- The grassland abundance of each polygon must then be established by a method appropriate for the class concerned. Different classes may well require different methods and a different timing. The LPIS community has been using several methods, any of which may be applied after demonstrating the result is realistic (i.e. compared to the reality on the ground) and relevant (in IACS terms): Some, not all, of the methods already demonstrated by LPIS custodians are:
 - ◊ applying pre-set scorecards by both photo-interpreters and field observers,
 - ◊ perform multi-temporal image analysis and classification (multiannual and seasonal vegetation monitoring) with a variety of sensors,
 - ◊ automatic classification of lidar and radar imagery, and
 - ◊ detailed photointerpretation or field survey.
- A statistical analysis of the sample should confirm its representativeness for a single and specific class, i.e. results adhere to a normal distribution and the standard deviation is less than 5%. If either one of these conditions is false, refining or redefining the classes of the eligibility profile should be considered. An iteration of the assessment should follow.
- The sample retained as representative for a specific pro rata PG land cover class shall be used for further processing of that land cover class:
 - ◊ When visual photointerpretation or field observation are applied, the relevant data can be used to develop and document an interpretation key.
 - ◊ For automatic classification, the sample (stored as multispectral and multi-temporal imagery) can be used training in supervised classification, or for post-classification of unsupervised classification.

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11 PR Categorizing class reductino coeficient into categories

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- Pro rata categories represent groups of land cover classes that share a common value of eligibility rate, even if they may relate to completely different permanent grassland land cover classes.
- When the sample used for pro rata assessment yields a normal distribution with a low standard deviation, pro rata categories can be determined by:
 - ◊ calculating the area weighted mean RC of the sample,
 - ◊ applying no reduction when the pro rata RC calculation result is below 10%; full eligibility applies,
 - ◊ deducting any result above 10% from 100% and round that difference to the nearest 5.

Example of possible set of eligibility rates is given below:

LC Class	observed RC [%]	100-RC	Pro rata category	Eligibility rate
Class 1	2.2	97.8	Grassland	100%
Class 2	8.9	91.1	Grassland	100%
Class 3	10.6	89.4	Grassland90	90%
Class 4	37.7	62.3	Grassland60	60%
Class 5	42.3	57.7	Grassland60	60%
Class 6	43.9	56.1	Grassland55	55%
Class 7	66.0	44.0	Grassland0	0%

- By default, if the rate of eligibility drops below 50%, as for class 7 above, the land cover class RC should be set to zero. As an exception, below 50% eligibility grasslands should only be in the eligibility profile if the class is very specific and if the scattering of its ineligible features produces a standard deviation of the RC below 2%. Else, 20% of all class 7 cases would individually have 40% or less grass and imply a quantification error of more than 10%. Therefore, a careful analysis of the standard deviation of the class RC assessment is due.
- Each of the retained pro rata LC classes has to be inserted in the eligibility profile with its precise definition, detailed description and eligibility rate assessment documentation.

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12 PR Establishing the reference area

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- The reference area of any reference parcel quantifies the totality of the eligible area it demarcates per scheme. The traditional agricultural area (arable, PG and permanent crops) are contributing in full, while the grassland with scattered ineligible features is contributing according to the eligibility rate of the pro rata category to which that class belongs.
- If several types of agricultural land cover simultaneously exist within a single reference parcel, their respective area contributions, full or pro rata, are summed up for the reference area.
- The reference area of all reference parcels where a pro rata class is present must be revised according to this common procedure.

Example of land cover inventory of a reference parcel and determination of the eligible hectares present, is given below:

LC Class	Pro rata category	Eligibility rate	Geometric area [ha]	Eligible hectares [ha]
Class 1	Grassland	100%	10	10
Class 8	Arable	100%	10	10
Class 5	Grassland60	60%	10	6
RP total	n/a	n/a	30	26

- Although the sub-parcels that contributed to the reference area are not necessarily relevant for all IACS processes, the delineation vectors should remain accessible in the system as they may be reused at some point for the processes related to crop diversification and for the annual LPIS quality assessment.

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13 PR Sporadic assessment

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- The systematic approach proposed above aspires for a region wide application and it reduces quantification risk with stable, class dependent photo-interpretation rules and a documented low standard deviation of the class RC. The sporadic application is by definition not subject to these restrictions. It can be expected to be more error prone and should therefore be used very carefully and sensibly. Essentially, the sporadic assessment is a grassland assessment method, as described above, on a parcel by parcel basis.
 - ◊ During LPIS creation and upkeep processes, it is used inside a single reference parcel to determine the percentage of grasses and other herbaceous forage. Good practice requires that the assessment is then well documented for that reference parcel.
 - ◊ During aid application and OTSC processes, it is used to determine the number of eligible hectares of the declared agricultural parcel. To be relevant in the scope of this technical guidance, it is assumed that the agricultural parcel concerned matches its reference parcel one to one.
- Either application returns a percentage of the grass and herbaceous forage present. Categorize this percentage by applying the [example of rules of figure of 2.6.1](#) of document DSCG/2014/33. It sets thresholds at 50%, 70% and 90%; resulting in categories of grassland60 and grassland80 as illustrated in the table below. The final reference area or eligible hectare follows by calculating the reference parcel geometric area or the agricultural parcel measurement with the corresponding eligibility rate.

Example of possible set of eligibility rates:

percentage [%]	Pro rata category	Eligibility rate
97.8	Grassland	100%
91.1	Grassland	100%
89.4	Grassland80	80%
62.3	Grassland60	60%
56.1	Grassland60	60%
44.0	Ineligible land	0%

- Eligibility rates below 50% are not supported for sporadic assessments because the Commission Services believe such isolated cases represent too high a risk of ineligibility.
- Although it is quite difficult to define a detailed set of requirements for the application of the sporadic methodology, some general recommendations should apply:
 - ◊ ensure that the field conditions are really unique, will not likely be found in other locations, or that no mapping methodologies are available.
 - ◊ document the methodology, the observations and transaction for each individual reference parcel. Ensure that the resulting value withstands scrutiny.
 - ◊ when applied to an agricultural parcel, ensure that the result matches a reference parcel and reflects a stable condition before updating the reference parcel's reference area. If either of these conditions is not met, flag the reference parcel for LPIS update.

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14 PR Data capture

This is a structural article to introduce the data capture. The data capture structure describes source data and procedures for providing values of the databases elements identified above.

All subchapters except the last one relate to the systematic methodology.

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15 PR Additional information


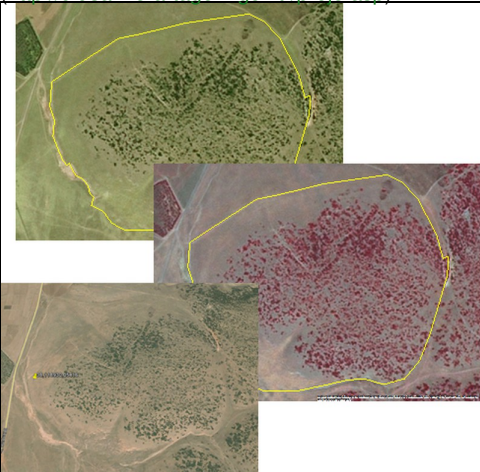
Go up to the [main pro rata page](#)

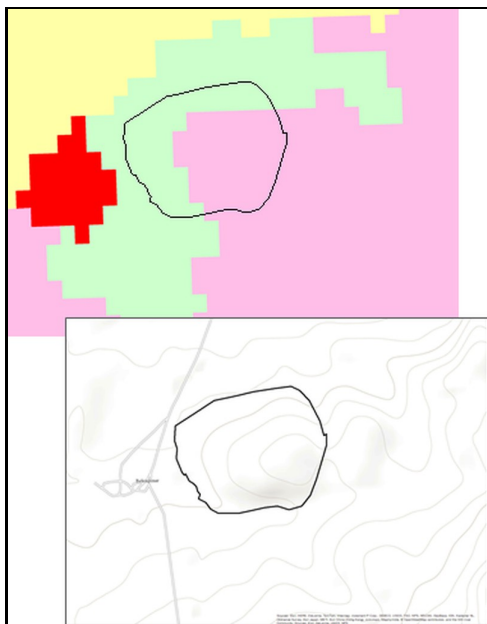
15.1 general

- The DGJRC will provide statistical methods for land cover class RC assessment.
- The DGJRC invites the LPIS custodians to share any methodologies, practices, field cases and experiences. With the permission of the LPIS custodian, the DGJRC will publish a selection of the typical pro rata land cover classes and assessment methods.

15.2 Example of systematic pro rata application

15.2.1 Step 1: Retrieve and compile the available data

Description	Image																																						
<p>A reference parcel encloses among other lands, area of permanent grassland with low productivity that is considered suitable for extensive grazing</p>	 <p>fictitious RP with pro rata grasslands on top of extract from World Imagery (http://services.arcgisonline.com/arcgis/services)</p>																																						
<p>e.g. agro-ecological data from a permanent grassland register</p>	<p>Durak No: MRS068</p> <table border="1"> <thead> <tr> <th colspan="2">Durakta Tespit Edilen Bitki Türleri</th> </tr> </thead> <tbody> <tr> <td>Bölge</td><td>: Çukurova</td> </tr> <tr> <td>Yıl</td><td>: 2010</td> </tr> <tr> <td>İl</td><td>: Kahramanmaraş</td> </tr> <tr> <td>İlçe</td><td>: Afşin</td> </tr> <tr> <td>Köy</td><td>: Taşın</td> </tr> <tr> <td>Hektar</td><td>:</td> </tr> <tr> <td>Koordinatlar</td><td>: E : 38,42519 B : 36,88621</td> </tr> <tr> <td>Rakım</td><td>: 1314 m</td> </tr> <tr> <td>Köye Uzaklık</td><td>: 0 km</td> </tr> <tr> <td>Yönü</td><td>: Güney</td> </tr> <tr> <td>Eğim</td><td>: Orta Eğim (6-11)</td> </tr> <tr> <td>Taban Arazi</td><td>:</td> </tr> <tr> <td>Erozyon Derecesi</td><td>: Orta >5 ile <10</td> </tr> <tr> <td>Taşlık</td><td>: Aşın (40-79)</td> </tr> <tr> <td>Derinlik</td><td>: Sığ (20-49)</td> </tr> <tr> <td>Ana Materyal Niteliği</td><td>:</td> </tr> <tr> <td>Fizyografya</td><td>:</td> </tr> <tr> <td>Dülatma</td><td>:</td> </tr> </tbody> </table> <p>a grassland register - extracts the project for the management and use of natural grassland, Turkey (http://ulusalmerla-tagem.gov.tr/proje.asp)</p>	Durakta Tespit Edilen Bitki Türleri		Bölge	: Çukurova	Yıl	: 2010	İl	: Kahramanmaraş	İlçe	: Afşin	Köy	: Taşın	Hektar	:	Koordinatlar	: E : 38,42519 B : 36,88621	Rakım	: 1314 m	Köye Uzaklık	: 0 km	Yönü	: Güney	Eğim	: Orta Eğim (6-11)	Taban Arazi	:	Erozyon Derecesi	: Orta >5 ile <10	Taşlık	: Aşın (40-79)	Derinlik	: Sığ (20-49)	Ana Materyal Niteliği	:	Fizyografya	:	Dülatma	:
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<p>e.g. multi-temporal and multi-spectral image data (optical, SAR, LIDAR,...)</p>	 <p>various imagery- extracts from World Imagery (http://services.arcgisonline.com/arcgis/services) and Copernicus Core_003 Seamless Mosaic (http://land.copernicus.eu/pan-european/high-resolution-image-mosaic/very-high-resolution/vhr-2012/view)</p>																																						
<p>e.g. ancillary data, thematic maps, topomaps....</p>																																							



maps - extract from: (top) the raster thematic data of Corine Land Cover (<http://land.copernicus.eu/pan-european/corine-land-cover/view>); (bottom) World_Terrain_Base (<http://services.arcgisonline.com/arcgis/services>)

Note: (1) World Imagery sources: Esri, DigitalGlobe, Earthstar Geographics, CNES/Airbus DS, GeoEye, USDA FSA, USGS, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community; (2) World Terrain Base sources: Sources: Esri, USGS, NOAA; (3) Copernicus Core 03 source: SPOT 5 © CNES (2010-2013), distribution Astrium Services/Spot Image S.A.

15.2.2 Step 2: Define pro-rata classes in the eligibility profile


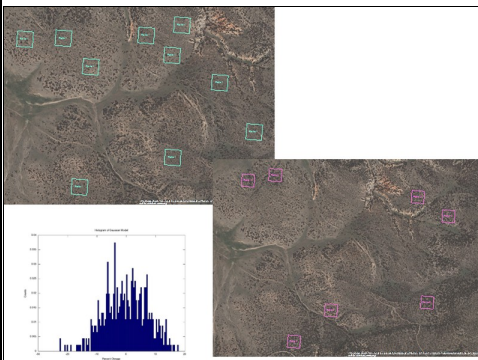
Description	Image/Result
<ul style="list-style-type: none"> Observe the physical reality on the ground Detect the type of the intrinsic mix present Retrieve the distinct characteristics of the mix <ul style="list-style-type: none"> Check scattering pattern, density, physiognomy, phenology, topography, location, edaphic conditions, etc. Verify the visibility and stability of these characteristics in time Decide whether mix is natural in origin or derived from particular agronomic practice <ul style="list-style-type: none"> Check farmer data, if available Verify the regional variability of the proposed class 	<p>identification of reliable land cover classes on top of extract from World_Imagery (http://services.arcgisonline.com/arcgis/services)</p>
<ul style="list-style-type: none"> Provide semantic definition of the pro-rata classes, based on the findings Elaborate detailed description of the class using FAO LCCS or ISO19144-2 (LCML) Derive photointerpretation keys or training data for automated classification Share findings and documentation to stakeholder community (farmers, LPIS operators, OTSC inspectors) 	See outcome table below

15.2.2.1 outcome: comprehensive grassland class definitions

LCCCCode	LCCLevel	LCCOwnLabel	LCCOwnDescr	LCCLLabel	MapCode	User Description
21669-127116	A6A20B4XXXXXXF1-A21B15	G1	Closed to Open Grassland	Closed to Open (100-40)% Medium To Tall Grassland, Single Layer	Gp	grassland (both managed and natural)
20299-Zt1(4)[Z1](1)	A1A11B1XXXXXXF2F4F7G4-A13G11-Zt1Z1	G2	Grassland with Very Open (30-10%) Woody Vegetation	Open (50 - 10%) Woody Vegetation with Medium to Tall Herbaceous Layer Floristic Aspect: Graminoids User-defined classifier (Z1): Clusters of scattered woody vegetation, following regular pattern, cover 10 to 30% of the area	Gr_Wvop_1	closed grassland with woody vegetation, where grassland is predominant. Clusters of woody vegetation cover the area in the range of 10 to 30%
20299-Zt1(4)[Z2](1)	A1A11B1XXXXXXF2F4F7G4-A13G11-Zt1Z2	G3	Grassland with Very Open	Open (50 - 10%) Woody Vegetation	Gr_Wvop_2	closed grassland with

			(50-30%) Woody Vegetation	with Medium to Tall Herbaceous Layer Floristic Aspect: Graminoids User-defined classifier (Z2): Clusters of scattered woody vegetation, following regular pattern, cover 30 to 50% of the area	woody vegetation, where grassland is predominant. Clusters of woody vegetation cover the area in the range of 30 to 50%
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15.2.3 Step 3: Assess the class reduction coefficient (RC)

Description	Image
<p>For each of the defined classes:</p> <ul style="list-style-type: none"> Define the minimum area of interest (AOI) that correctly represent the spatial pattern of the intrinsic mix between agriculture and non-agriculture land cover features Use the precise land cover definition from the eligibility profile Determine the optimal timing of the year to detect the abundance of the vegetation and to spot any relevant agriculture activity <p>Note: Optimal timing is often when the vegetation reaches its maximum phenological development</p>	 <p>AOI for pro-rata Class G2</p> <p>AOI for pro-rata Class G3</p> <p>Areas of interest on top of extract from World Imagery (http://services.arcgisonline.com/arcgis/services)</p>
<p>For each of the defined classes:</p> <ul style="list-style-type: none"> Locate and select a sample of at least 30 such areas of interest randomly spread all over the country/region Derive the abundance of the grassland for each of the areas of interest with the appropriate method: <ul style="list-style-type: none"> Manual photointerpretation Automated classification (pixel or object based) Applying pre-set scorecards Perform statistical analysis of the resulted RC (non-agri land/grassland) <ul style="list-style-type: none"> Results should adhere to a normal (Gaussian) distribution and standard deviation (StDev) is less than 5% If not AOI or class definition should be refined 	 <p>RC measurement and analysis - extract from World Imagery (http://services.arcgisonline.com/arcgis/services); histogram of Synthetic Gaussian Data, Math-Blog (http://math-blog.com/2011/04/25/plotting-and-graphics-in-octave)</p>

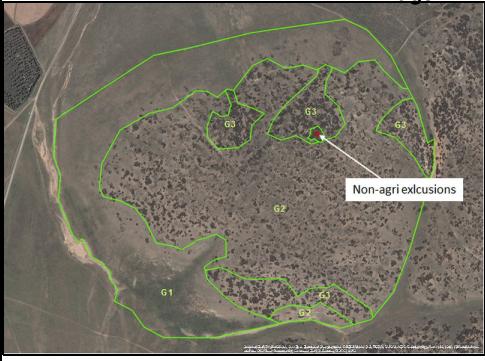
15.2.4 Step 4: Categorize class reduction coefficient into its pro-rata category

Description	Result
<p>For classes with samples yielding normal distribution and low StDev:</p> <ul style="list-style-type: none"> Determine the pro-rata categories by: <ul style="list-style-type: none"> Calculating the mean RC from the sample For mean RC less than 10%, apply no reduction" For any RC above 10%, derive the pro rata rate by subtracting the RC from 100, and round to nearest 5 to get the eligibility rate Update the eligibility profile, if needed (in this case user defined Z-attributes in LCCS will be updated) 	See outcome table below

15.2.4.1 outcome: eligibility profile classes

LC Class	observed RC [%]	Pro-rata rate=100-RC	Pro rata category	Eligibility rate	MapCode	User description
Class G1	0	100	Grassland	100%	Gp	Grassland (both managed and natural)
Class G2	22,3	77,7	Grassland80	80%	Gr_Wvop_1	Closed grassland with woody vegetation, where grassland is predominant. Clusters of woody vegetation cover the area in the range of 10 to 30%
Class G3	38,5	61,5	Grassland60	60%	Gr_Wvop_2	Closed grassland with woody vegetation, where grassland is predominant. Clusters of woody vegetation cover the area in the range of 30 to 50%

15.2.5 Step 5: Establish the reference area for the reference parcel

Description	Image
<ul style="list-style-type: none"> • Delineate all agriculture land cover (different types of grassland) following the class entries in the eligibility profile • Exclude any individual clusters of woody vegetation (not grazed and not accessible) • Sum up the resulted polygon areas per category • Calculate the reference area for the RP, following the table template 	 <p>Mapped pro rata polygons on top of extract from World_Imagery (http://services.arcgisonline.com/arcgis/services)</p>

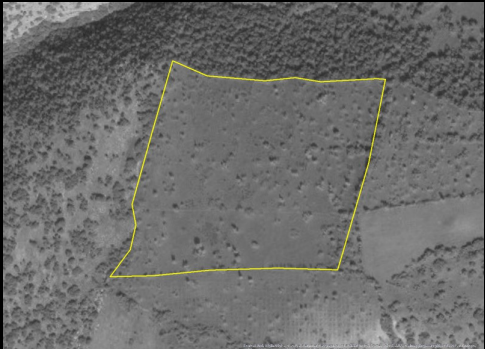
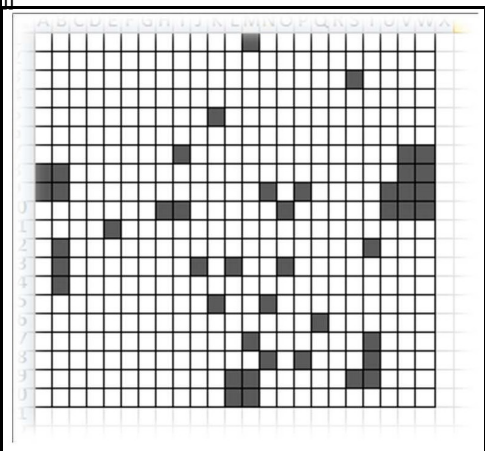
15.2.5.1 outcome: reference parcel reference area

polygons	LC Class	Pro rata category	Eligibility rate	Geometric area [ha]	Eligible hectares [ha]
1	G1	Grassland	100%	23.5	23.5
2+3	G2	Grassland80	80%	35.6	28.5
4+5+6+7	G3	Grassland60	60%	7.8	4.7
1-7	PG	n/a	n/a	66.9	56.7

Field examples can be found [here](#)

15.3 Example of sporadic pro rata application

The parcel in the figure has pro rata grassland, but no systematic land cover grassland class has been defined.

Action	Illustration
<p>Step 1: Prepare the reference or agricultural parcel for assessment Retrieve ancillary information if available.</p> <p>The parcel's polygon in the picture delineates an area of 3.2 ha.</p>	 <p>a parcel with pro rata grassland on top of extract from World_Imagery (http://services.arcgisonline.com/arcgis/services)</p>
<p>Step 2: Establish the proportion of grassland</p> <p>In this case:</p> <ul style="list-style-type: none"> • by using a scorecard or other means. • that assessment reveals that 77% of the area is actually covered by grass or other herbaceous species that can be grazed. 	 <p>example of an area frame scorecard; source: Paola Codipietro, FAO</p>
<p>Step 3: Reduce the polygon area according to the corresponding pro rata category to obtain the new reference area / maximum eligible area.</p> <p>In this case,</p> <ol style="list-style-type: none"> 1. the proportion of grassland is 77% 2. the resulting category is grassland80 	<p>See the conversion table below</p>

3. the reference area will be set at 0.8 x 3.2 ha = **2.56ha**

Conversion table

percentage [%]	Pro rata category	Eligibility rate
90-100	Grassland	100%
70-89.9	Grassland80	80%
50-69.9	Grassland60	60%
<50	Check!!!	tbd

A field example can be found [here](#)

Go up to the [main pro rata page](#)

16 PR Constraint information

Go up to the [main pro rata page](#)

- Application of a pro rata methodology should be consistent over the LPIS territory.
- This technical guidance deals with PG and scattered ineligible features. Where a particular landscape feature located in PG is eligible or ineligible solely depends on the choices made by the LPIS authority regarding cross-compliance (GAEC 7). Those choices have to be consistently applied when such landscape elements are scattered in the grassland.
- The proposed pro rata measurement methodology cannot be used to circumvent the Regulation eligibility exclusion rule of 100 trees per hectare.
- The systematic methodology assumes pro rata grassland classes that demonstrate both spatial probability of the scattering and temporal stability. Spatial probability is ideally described by the known concepts homogeneity and isotropy of a pepper and salt pattern but potentially also by transitional density-scale patterns. In such conditions the real challenge to define these density classes in such a way that the border of two adjacent density classes can be easily delineated on the source image. Transitional grasslands, in the sense of evolving over time, are not in scope.
- During LPIS quality assessment, different pro rata categories shall be regarded as separate land cover types. Therefore, classifying one pro rata category (e.g. grassland60) as another pro rata category (grassland90) is considered a classification error (like classifying an arable land to any grassland type). A non-conforming verdict will follow even if the observed area difference is conforming.
- Regardless whether the systematic or the sporadic method is used to determine the reference area or MEA, whenever that value is brought in the LPIS one must assume it will be used in farmer's applications during the years that follow. Since pro rata parcels are inherently risky, such parcels should always be actually inspected during an OTSC. If either the method used is imprecise or the grass density has substantially lowered, the declared area will differ from the determined area, to be used for the calculation of the payment. This 'area not found' will also enter the statistics. Implementation choices should strive to minimize the number of such cases.

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European Commission
Joint Research Centre - Institute for Environment and Sustainability

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