

## **Amendment 1 to the GLORIA Field Manual, 5th edition (published 2015)**

This amendment specifies a few details regarding the different methods of species recording. Although sufficiently described in the manual, we wish to emphasize that methods should be clearly separated. See therefore below the remarks to the concerned work steps in red and the amended field sheets (Form 2 and Form 3).

This does not imply any change of methods previously described in the GLORIA field manual.

### **Recording steps in 1m<sup>2</sup>-quadrats**

#### **[ad chapter 4.1 in the field manual] Recording in the 1-m<sup>2</sup> quadrats**

[ad 4.1.1] Visual cover estimation in 1-m<sup>2</sup> quadrats

- WORK STEP H Recording of habitat characteristics (surface cover types)
- WORK STEP I Recording of the species composition and cover

[ad 4.1.2] Pointing with a grid frame in 1-m<sup>2</sup> quadrats

- WORK STEP J Pointing of surface types and vascular plant species

**NEW:** Whenever you detect a new species through the work step J (i.e. it was not detected in the particular quadrat in the previous work step I), you need to add the species name in Form 2 and you must write a “P” in column “add.” and subsequently visually estimate the percentage cover of the concerned species.

Note that this is an exceptional case, because the pointing method usually does not capture rare species, but the methods should be kept separated.

#### **[ad chapter 5.1.2] Subplot-frequency counts in the 1-m<sup>2</sup> quadrats (OPTIONAL)**

**NEW:** In the case that you also apply this optional additional recording method, make sure that you do not intermingle with the obligatory methods of work steps I and J. A potential case would be that you detect a new species in a particular quadrat through this optionally additional recording method (i.e. it was not detected in the particular quadrat in the previous work steps I and J). Do not enter the species in Form 2 without additional documentation. If you decide to enter species from the frequency Form 5-S to Form 2, you must write an “F” in column “add.” and subsequently visually estimate their percentage cover.

## Recording steps in the summit area sections (SASs)

### [ad chapter 4.2] Recording in the summit area sections

- WORK STEP K Complete species list with an estimated abundance of each species in ordinal abundance categories

Note: The species lists of the upper summit area sections (SASs) must also contain all species found in the quadrats that lie within the section. Therefore, crosscheck your sampling sheet of the quadrats and the respective SAS for possibly overlooked species.

NEW: Whenever you find a species in the respective quadrats (Form 2) which you overlooked in the SAS (Form 3), add such 'missing' species in Form 3 and write an "X" in column "add." and estimate the abundance.

Note that this is an exceptional case, because the four quadrats only represent a small fraction of a summit area section.

# Form 2 1-m<sup>2</sup> quadrat

AMENDED 20180705

Country code <sup>1)</sup>		Date	Aspect <sup>2)</sup>
Target region code <sup>1)</sup>		Recording time from to	
Summit code <sup>1)</sup>		Researcher(s)	Slope (°) <sup>3)</sup>
Quadrat code <sup>1)</sup>			

## Top cover of surface types (%)<sup>4)</sup>

		Pointing hits <sup>9)</sup>	Total hits <sup>10)</sup>
Vascular plants			
Solid rock			
Scree			
Lichens on soil not covered by vascular plants			
Bryophytes on soil not covered by vascular plants			
Bare ground			
Litter			
	100%		

## Subtypes in % of the top cover type<sup>5)</sup>

Lichens below vasc. pl.		Bryoph. below vasc. pl.	
Lichens on solid rock		Bryophytes on solid rock	
Lichens on scree		Bryophytes on scree	

General comments on the quadrat

## Plant species cover (%)<sup>6)</sup>

Species	cf. <sup>7)</sup>	%-cover <sup>6)</sup>	Pointing hits <sup>9)</sup>	Total hits <sup>10)</sup>	add. <sup>11)</sup>
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

	Cover sum <sup>8)</sup>
Total number of vascular plant species	

If you have used extra sheets, indicate their number (e.g. 1 of 2, 2 of 2 etc...)

See back page for footnotes

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**NOTES: FORM 2     1-m<sup>2</sup> QUADRAT**

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- 1 See [Box 6.1](#) for coding.
- 2 Average aspect of the quadrat surface (N, NE, E, SE, S, SW, W, or NW).
- 3 Average slope angle of the quadrat surface (in degrees, 360° scale).
- 4 The vertical projection of cover (perpendicular to the slope angle), all types together add up to 100% (for definitions of surface types see under 4.1.1). Top cover of surface types is surveyed by visual estimation as well as through pointing.
- 5 The top cover of subtypes is estimated as percentage of the respective top cover surface type (see under 4.1.1).
- 6 Percentage cover of each species, surveyed by visual estimation (see chapter 4.1.1); avoid indications such as less than (<) or more than (>); all vascular plants must be recorded; lichens and bryophyte species are optional (see [Box 4.2](#)); indicate species either by using species names or by (provisional) codes.
- 7 Use the cf. column if the identification of the taxon is doubtful (use g if this is the case for the genus level, s for the species level, t for a lower taxonomic level); make a specifying comment in such cases.
- 8 Check the cover sum (the cover of all species together) against the top cover surface type "vascular plants": the cover sum of all vascular plant species can be higher but not lower than the top cover of vascular plants surface type - the cover sum can be more than 100 % in dense vegetation due to overlapping layers (see under 4.1.1).
- 9 Use a grid frame of 1 m × 1 m inner width with 100 crosshair points (see [Fig. 4.2](#)) and a pin/knitting needle of 2 mm diameter for point recording at 100 points. Always conduct pointing after you have completed visual cover estimation. Where you hit with your pin a surface without vascular plants, make a stroke at the respective surface type. Where you hit vascular plants, make a stroke at the respective species - record all vascular plant species that you hit at a point, i.e. also species at the lower vegetation layers are considered (but do not make a stroke for a surface type that lies below a vascular plant).
- 10 Enter the sum of all strokes of the tally.
- 11 This concerns only species which were previously not found during the visual species cover sampling: Enter "P" if species was detected only through pointing and "F" if species was only found through the optional method of subplot-frequency counts.

# Form 3 Summit area section (SAS)

**Codes of<sup>1)</sup>**

Country	
Target region	
Summit	
SAS	
Date	
Time from	to

Researcher(s)
Comments on grazing impacts <sup>3)</sup>

**Top cover of surface types (%)<sup>2)</sup>**

Vascular plants	
Solid rock	
Scree	
Lichens (excl. epilithic)	
Bryophytes	
Bare ground	
Litter	
<b>SUM</b>	<b>100%</b>

Species <sup>4)</sup>	cf. <sup>5)</sup>	Abundance <sup>6)</sup>	add. <sup>7)</sup>	%-Cover <sup>8)</sup> (optional)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
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21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

Species <sup>4)</sup>	cf. <sup>5)</sup>	Abundance <sup>6)</sup>	add. <sup>7)</sup>	%-Cover <sup>8)</sup> (optional)
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
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54				
55				
56				
57				
58				
59				
60				

Comments on species recording

Total number of vascular plant species in this *summit area section*

See back page for footnotes

If you have used extrasheets, indicate their number (e.g. 1 of 3, 2 of 3, etc.)

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**NOTES: FORM 3      SUMMIT AREA SECTION (SAS)**


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1 See [Box 6.1](#) for coding; for summit area sections (SAS), e.g. N05, N10, E05.

2 Visual cover estimation of the surface types (top cover) within the summit area section, indicated as percentage value; see chapter 4.2.

3 Comment on impacts of grazing such as faeces, browsing damage, trampling; see [Box 4.6](#).

4 Entering all vascular plant species is **obligatory**; lichens and bryophyte species are **optional** (see [Box 4.2](#)); indicate species either by using species names or by (provisional) codes.

5 Use the cf. column if the identification of the taxon is doubtful (use **g** if this is the case for the genus level, **s** for the species level, **t** for a lower taxonomic level); make a specifying comment in such cases.

6 Indicate the abundance of species in five qualitative abundance categories (obligatory):

**r! (very rare):** one or a few small individuals.

**r (rare):** some individuals at several locations, can hardly be overlooked in a careful observation.

**s (scattered):** widespread within the section; the species cannot be overlooked but its presence is not obvious at first glance (not necessarily an evenly dispersed distribution over the entire summit area section).

**c (common):** occurring frequently and widespread within the section – presence is obvious at first glance (cover is less than 50%).

**d (dominant):** very abundant, making up a high portion of the phytomass, often forming more or less patchy or dense vegetation layers; species covers more than 50% of the area of the SAS (this is the only abundance class which is entirely related to cover).

7 Only for 5m-SAS: Indicate with X if species was not found during the survey of the SAS, but added after cross-check with species-list from 1m<sup>2</sup>-quadrats located in the same section

8 Only optional (as an additional record): Percentage cover estimation for each species; avoid indications such as: less than (<) or more than (>). Percentage cover may either be surveyed by direct visual cover estimation or by point-line intercepts (for the more common species) and recording of area cover (i.e. the exact area size, such as m<sup>2</sup>, dm<sup>2</sup>, etc.; for the rarer species) which can be converted into percentage cover later on (PAF method; see chapter 5.5.2).