

**Management of Natural Resources and Safeguarding of Ecosystem Services for Sustainable Rural Development in the South Caucasus - ECOserve**

## **Mapping of Selected Freshwater Habitats on the Emerald Sites of Western Georgia**



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**Report**

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## 1. Introduction

Emerald Network is a pan-European ecological network with the goal to preserve the biodiversity of Europe. The Network was established as part of the implementation process of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern, 1979), also known as the Bern Convention. Setting-up the Emerald Network at a national level is considered as one of the main tools for the Contracting Parties to comply with their obligations under the Bern Convention. The Emerald Network is an analogue of NATURA 2000 and is meant for those countries that are signatories to the Convention but are not member states of the EU. The overarching objective of the Emerald Network is to ensure that all high biodiversity areas of European importance are identified, their ecological inventories completed and their importance recognized legally.

During 2017-2020, forty six sites were officially designated as Emerald Sites on the initiative of the Georgian Government, marking the first precedent in the Caucasus region and additional progress was made by upgrading some of the proposed sites to candidate sites.

With habitat protection being the cornerstone of the Bern Convention, the entire process necessitates the identification and mapping of all habitats respectively, listed in Resolutions #4 and Annex #1 of Bern Convention, according to the EUNIS classification system. Georgia has made commitments to fulfil the obligations under CBD and the Bern Convention and to protect more than 60 different habitats listed in Res. #4. To date, distribution maps and data have been compiled according to the EUNIS and have become part of the Emerald Network database.

The recent evaluation process has revealed that certain freshwater habitats (such as C3.55 Sparsely vegetated river gravel banks; C3.62 Unvegetated river gravel banks and adjacent habitats) were originally incorrectly interpreted by the Georgian Emerald Network team of experts. Consequently those habitats were not mapped accurately. Hence, their distribution within the current Emerald Network was uncertain and it was not clear whether the network was sufficient to preserve those habitats.

These gaps, as well as those for the riverine woody habitats, were noted at the biogeographical evaluation seminar of proposed and candidate Emerald Network sites in Caucasus region (November 2017, Tbilisi) and “Emerald Network biogeographical evaluation seminar for bird species involving Armenia, Azerbaijan and Georgia” (October 2019, Budapest). According to the decision of the Bureau of the Bern Convention, April 2020, Georgia was requested to consider the submission of the information about the above-mentioned habitats to the Bureau by January 2021. For this purpose, additional information had to be collected during spring-summer 2020. Accordingly, the database and so called “Standard Data Forms” for the above-mentioned habitats had to be updated and uploaded.

The project “Mapping of Selected Freshwater Habitats on the Emerald Sites of Western Georgia” was initiated with the objective “To assist government of Georgia by providing additional information and creating detailed distribution maps of selected Bern Convention Res. #4 freshwater habitats, namely river gravel banks and adjacent riverine woods and scrubs that are part of the wider forest ecosystems in Georgia, inside the current Emerald Network sites of Western Georgia (Imereti, Samegrelo-Zemo Svaneti, Racha-Lechkhumi-Kvemo Svaneti, and Adjara) through remote sensing and extensive ground truthing and expert evaluation”.



**The Expected Outputs were:**

- Distribution range maps of the selected freshwater habitats for Emerald sites in western Georgia.
- Detailed maps of the selected freshwater habitats and adjacent riverine woods and scrubs inside the ASCIs.
- Updated Standard Data Forms for the Emerald Network sites.
- Report of the study in English and Georgian languages.



*Picture.1 The middle body of the river Magana with riparian forests (G1.127) and river gravel banks (C3.55, C3.62) in Samegrelo-Zemo Svaneti region included inside the Samegrelo 1 Emerald site*

## 2. Methodology

The process of identifying and mapping EUNIS habitats inside and outside the Emerald Network included the following steps:

In the first stage, the study sites were identified. River gravel banks were found in many ASCIs as well as other areas of the country. The study sites were selected based on the existing habitat distribution maps in the NACRES database and the multi-spectral satellite image analysis of different sources (both open-source and commercial) in combination with Sentinel-2 10 m. resolution images and satellite imagery donated by GIZ to the Georgian government.

As a result of spectral analysis, the preliminary habitat distribution range polygons were generated for west part of Georgia. Due to resource and time limitations, only the areas inside the ASCI were evaluated on the ground to validate the habitat types based on EUNIS classification system. A field team consisting of a botanist, a forester and field officers conducted the ground-truthing work, identifying the river gravel banks and adjacent riparian forest habitat types. The field data was processed in GIS tools as a result of which digital maps of the target habitats were created not only for evaluated ASCIs but also for all Georgia (although habitat distribution maps are accurate for the Emerald Network since ground-truthing only involved target ASCIs). Draft results were shared with key stakeholders through a workshop. The maps were finalised based on the comments received from the stakeholders.



*Picture.2 A panorama of the landscape covering the complex mosaic of freshwater habitats, broad-leaved and coniferous forests, alpine grasslands, siliceous rocks and temporary snow cover in Upper Svaneti.*

### 3. Activities and Results

#### Preparatory work

As a result of spectral analysis in the initial phase six target habitat types (see **Appendix 1**) were identified in the Emerald sites by the GIS expert and the botanical team and the preliminary maps were created based on the satellite imagery. The preliminary maps were later used in the field to check and verify the accuracy of the habitat identification and their borders. The following regions were included in the study: Adjara, Imereti, Racha-Lechkhumi-Kvemo Svaneti and Samegrelo-Zemo Svaneti. The study sites were selected based on the existing habitat distribution maps in the NACRES database and the multi-spectral satellite image analysis of different sources (both open-source and commercial) in combination with such as Sentinel-2 10 m. resolution images and satellite imagery donated by GIZ to the Georgian government.

As a result of spectral analysis, the preliminary habitat distribution range polygons were generated for west Georgia. Due to project limitations, only the areas inside the ASCI were evaluated on the ground to validate the habitat types based on EUNIS classification system.

The acquired data and geographic distribution maps were the prerequisites for the further studies during which the satellite results were ground-truthed in the field for the final ascertaining of the habitat boundaries.

#### *Field studies*

Ten Emerald Network sites were included in the four field surveys organized by the field team (see **Appendix 2**). The field team consisting of a botanist, a forester and field officers conducted the ground-truthing work, identifying the riverbank and adjacent riparian forest habitat types. The data were obtained by means of a special field program and processed using GIS technologies. The GIS analyzes part was carried out by Dachi Kanchaveli.

The field studies took place from June through November 2020. The field data were processed in GIS tools as a result of which digital maps of the target habitats were created not only for evaluated ASCIs but also for some parts of west Georgia.

The field work involved identification of the target areas where the team had to verify the accuracy of the preliminary maps. Later the field team took notes and the distribution pattern of the habitats. The final results acquired from the field studies depict the study habitat distributions with high accuracy both inside the Emerald sites and adjacent to them.





*Picture.3 Identifying habitat type in the field.*

#### *Preparation of the final database*

As a result of conducted works, target freshwater habitat types were identified on the Emerald sites of Western Georgia (see **Appendix 3** and **Appendix 5**). The results of the project were compiled in the database including all the target habitats, distribution maps, shape files and digital data (area in ha, etc.).

The results were submitted to the Ministry of Environmental Protection and Agriculture of Georgia.

## 4. Study findings

It is important to note that, due to the project framework, the studies were carried out only on the Emerald Sites of Western Georgia. Accordingly, the results do not represent the overall distribution of the target habitats in Western Georgia.

### Black Sea Biogeographic Region

- The following target habitats were identified on 13 Emerald Network sites of the Black Sea Biogeographic Region:

		G1.11 Riverine Salix woodland	G1.127 Ponto-Caucasian montane Alnus galleries	F9.1 Riverine scrub	E5.4 Moist or wet tall-herb and fern fringes and meadows	C3.55 Sparsely vegetated river gravel banks	C3.62 Unvegetated river gravel banks
Code	Emerald Site	Habitat area (ha)	Habitat area (ha)	Habitat area (ha)	Habitat area (ha)	Habitat area (ha)	Habitat area (ha)
GE0000014	Kintrishi		70,9				
GE0000016	Mtirala		59				
GE0000018	Ajameti		120				
GE0000021	Samegrelo		119,4			1,4	
GE0000026	Goderdzi	29	9,8	0,5	1	23,9	10,4
GE0000031	Machakhela		19				
GE0000041	Racha 3		52				
GE0000042	Racha 4		3			0,1	
GE0000050	Surami 3		18				
GE0000052	Surami 4		42,5				
GE0000053	Surami 5		9				
GE0000054	Chorkhi Delta	5	37	0,4	12,7	22,5	
GE0000057	Samegrelo 2		27,4				
<b>Total</b>		<b>34</b>	<b>587</b>	<b>0,9</b>	<b>13,7</b>	<b>47,9</b>	<b>10,4</b>

- As shown in the table **G1.127 (Ponto-Caucasian montane alder galleries)** habitat type is the most widespread of all the target habitat types occurring on 13 sites with a total area of 587 ha;
- F9.1 (Riverine scrub)** habitat was observed in very small areas on the Emerald Sites of Black Sea Biogeographic Region.

### Alpine Biogeographic Region

- Nine Emerald sites in the Alpine Biogeographic Region of western Georgia were studied and target habitats were identified on seven sites.



		G1.11 Riverine Salix woodland	G1.127 Ponto-Caucasian montane Alnus galleries	F9.1 Riverine scrub	E5.4 Moist or wet tall-herb and fern fringes and meadows	C3.55 Sparsely vegetated river gravel banks	C3.62 Unvegetated river gravel banks
Code	Emerald Site	Habitat area (ha)	Habitat area (ha)	Habitat area (ha)	Habitat area (ha)	Habitat area (ha)	Habitat area (ha)
GE0000011	Racha 1					4,5	41
GE0000014	Kintrishi		5,1				
GE0000021	Samegrelo		79,6			0,2	
GE0000026	Goderdzi	22,7	28,7	1,2	0,9	36,1	12,1
GE0000057	Samegrelo 2	0,7	312,6			7,4	
GE0000058	Racha-Lechkhumi	14,2	227		0,7	18	20
GE0000059	Svaneti-Racha		211		6	25	213
<b>Total</b>		<b>37,6</b>	<b>864</b>	<b>1,2</b>	<b>7,6</b>	<b>91,2</b>	<b>286,1</b>

- None of the target habitat types were identified on Svaneti 1 (GE0000012) and Svaneti 2 (GE0000045) sites.

## 5. Conclusions and recommendations

- Due to the project framework the target habitats were identified only in the Western Georgian Emerald sites. However, based on other available data and studies (including the study carried out by NACRES earlier the target habitats are widespread outside the premises of Emerald Network;
- For example, C3.55 and C3.62 river gravel bank habitats as well as G1.11 and G1.127 riparian forests are present along the valleys of the rivers Rioni, Tskhenistskali, Abasha and Intsra outside the Emerald Network (see **Appendix 4** - Habitat distributions inside and outside Emerald Network on the examples of Samegrelo 1 (GE0000021), Samegrelo 2 (GE0000057) and Svaneti-Ratcha (GE0000059) sites.)
- The Alpine Biogeographic Region in addition to western Georgia also covers large territories of eastern Georgia that were not surveyed by the project. This restricted us from having an overview of the entire distribution of the target habitats in the Alpine Biogeographic Region.

### Alpine Biogeographic Region

- In order to assess the sufficiency of the target habitats it would be necessary to also assess their distribution not only within the Emerald Network in eastern Georgia but also outside the network both in the West and in the East of the country.

### Black Sea Biogeographic Region

- In order to assess the sufficiency of the target habitats on the Emerald Network of the Black Sea Biogeographic Region it would be necessary to assess their extent outside the Emerald Network too, which should be done prior to the next. Biogeographic Seminar.

## Appendices

### Appendix 1. Target freshwater habitat types based on EUNIS classification

EUNIS habitat code	Habitat name	Description
C3.55	Sparsely vegetated river gravel banks	Vascular plant communities occupying gravel deposits of rivers, including pioneer vegetation and subsequent stages in the colonization sequence. Early-stage communities of Alpine, boreal and Mediterranean watercourses are specialised, those of nemoral lowlands and hills are related to other formations, in particular those of unit E3
C3.62	Unvegetated river gravel banks	Unvegetated deposit beds of streams formed of pebbles, gravels, boulders or a mixture of gravels and finer sediments, occupying the edges of the stream, forming islands in the channel or supporting the arms and rivulets constituting the stream, together with their associated animal communities. Corresponding habitats with pioneer or ephemeral vascular vegetation are included in unit C3.55 and their succession leads to willow woodland (G1.11).
E5.4	Moist or wet tall-herb and fern fringes and meadows	Tall-herb and fern vegetation of the nemoral and boreal zones, including stands of tall herbs on hills and mountains below the montane level. Tall herbs are often dominant along watercourses, in wet meadows and in shade at the edge of woodlands.
F9.1	Riverine scrub	Scrub of broad-leaved willows, e.g. [ <i>Salix aurita</i> ], [ <i>Salix cinerea</i> ], [ <i>Salix pentandra</i> ], beside rivers. Scrub of [ <i>Alnus</i> ] spp. and narrow-leaved willows, e.g. [ <i>Salix elaeagnos</i> ], where these are less than 5 m tall. Riverside scrub of [ <i>Hippophae rhamnoides</i> ] and [ <i>Myricaria germanica</i> ]. Excludes riversides dominated by taller narrow-leaved willows [ <i>Salix alba</i> ], [ <i>Salix purpurea</i> ], [ <i>Salix viminalis</i> ] (G1.1).
G1.11	Riverine willow woodland	[ <i>Salix</i> ] spp. scrub or arborescent formations, lining flowing water and submitted to periodic flooding, developed on recently deposited alluvion. Willow brushes are particularly characteristic of rivers originating in major mountain ranges. Shrubby willow formations also constitute an element of lowland and hill riverine successions in all major biomes, often making the belt closest to the water course. Taller arborescent willow formations often constitute the next belt landwards in riverine successions of lowland western nemoral, eastern nemoral and warm-temperate humid forest regions, and a large part of the less diverse riverine systems of the steppic, mediterranean and cold desert zones. Vegetation of alliance [ <i>Salicion albae</i> ], species [ <i>Salix alba</i> ], [ <i>Salix fragilis</i> ], [ <i>Populus alba</i> ], [ <i>Populus nigra</i> ], [ <i>Populus canescens</i> ], [ <i>Lycopus europaeus</i> ], [ <i>Lysimachia vulgaris</i> ], [ <i>Phalaroides arundinacea</i> ] and [ <i>Urtica dioica</i> ]. May be affected by the invasive alien species [ <i>Solidago canadensis</i> ],



		[ <i>Aster novi-belgii</i> ], [ <i>Aster novi-anglii</i> ], [ <i>Impatiens glandulifera</i> ].
G1.127	Ponto-Caucasian montane alder galleries	Riverside and lakeside alder galleries and cordons of the Pontic Range and the Caucasus system, with [ <i>Alnus subcordata</i> ], [ <i>Alnus barbata</i> ] or [ <i>Alnus incana</i> ].

## Appendix 2. Emerald sites included in the study

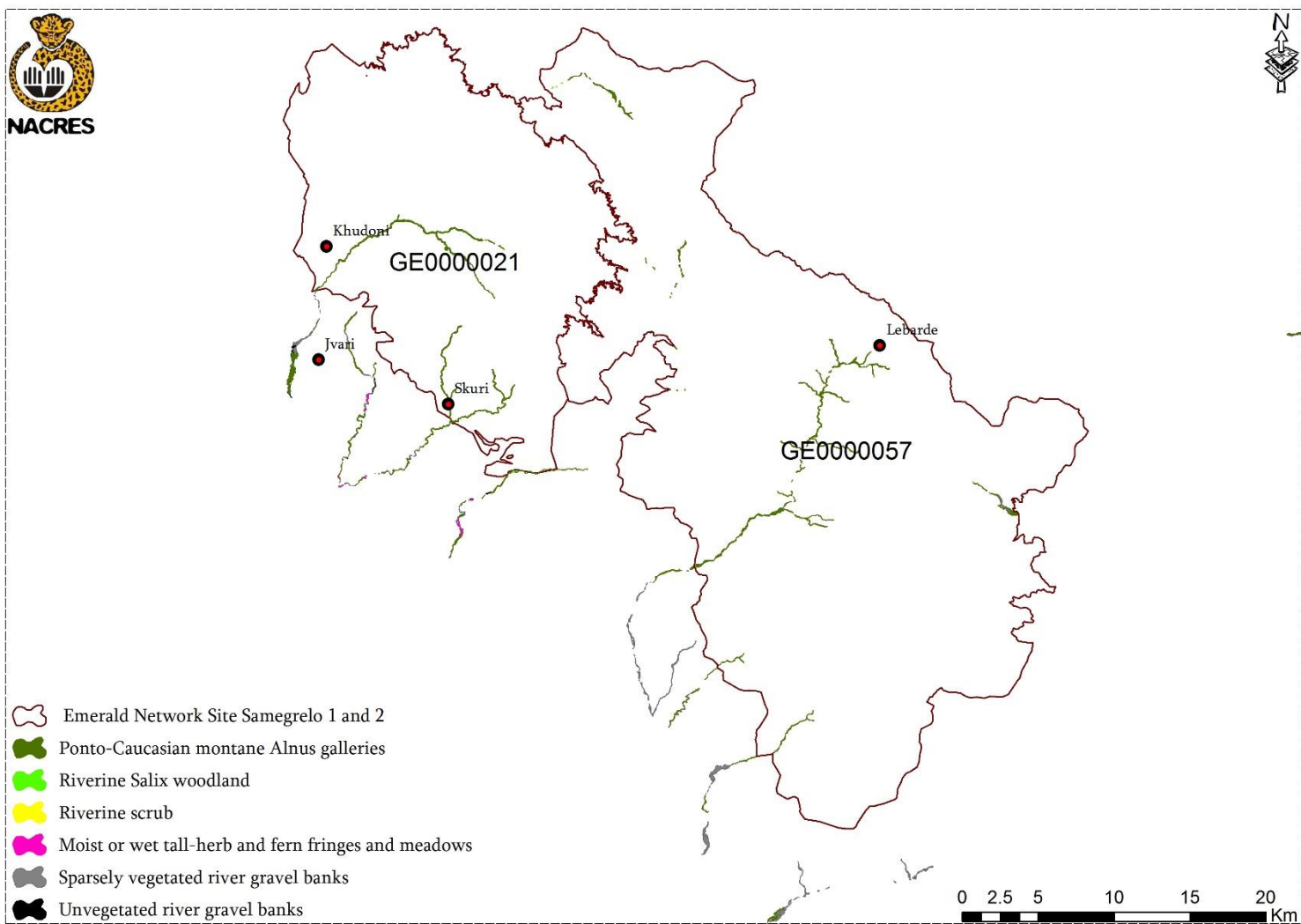
Site code	Site name
GE0000011	Ratcha 1
GE0000012	Svaneti 1
GE0000014	Kintrishi
GE0000016	Mtirala
GE0000018	Ajameti
GE0000021	Samegrelo
GE0000026	Goderdzi
GE0000031	Machakhela
GE0000041	Ratcha 3
GE0000042	Ratcha 4
GE0000045	Svaneti 2
GE0000050	Surami 3
GE0000052	Surami 4
GE0000053	Surami 5
GE0000054	Chorokhi delta
GE0000057	Samegrelo 2
GE0000058	Ratcha-Lechkhumi
GE0000059	Svaneti-Ratcha

### Appendix 3. Area covered by the study habitat in hectares per Emerald site

Code	Emerald Site	Habitat area (ha)	Habitat area (ha)	Habitat area (ha)	Habitat area (ha)	Habitat area (ha)	Habitat area (ha)
		G1.11 Riverine Salix woodland	G1.127 Ponto-Caucasian montane Alnus galleries	F9.1 Riverine scrub	E5.4 Moist or wet tall-herb and fern fringes and meadows	C3.55 Sparsely vegetated river gravel banks	C3.62 Unvegetated river gravel banks
GE0000011	Racha 1					4,5	41
GE0000014	Kintrishi		76				
GE0000016	Mtirala		59				
GE0000018	Ajmeti		120				
GE0000021	Samegrelo		199			1,6	
GE0000026	Goderdzi	51,17	38,5	1,7	1,9	60,0	22,5
GE0000031	Machakhela		19				
GE0000041	Racha 3		52				
GE0000042	Racha 4		3			0,1	
GE0000050	Surami 3		18				
GE0000052	Surami 4		42,5				
GE0000053	Surami 5		9				
GE0000054	Chorkhi Delta	5	37	0,4	12,7	22,5	
GE0000057	Samegrelo 2	0,7	340			7,4	
GE0000058	Racha-Lechkhumi	14,2	227		0,7	18	20
GE0000059	Svaneti-Racha		211		6	25	213
<b>Total</b>		<b>71,07</b>	<b>1451</b>	<b>2,1</b>	<b>21,3</b>	<b>139,1</b>	<b>296,5</b>

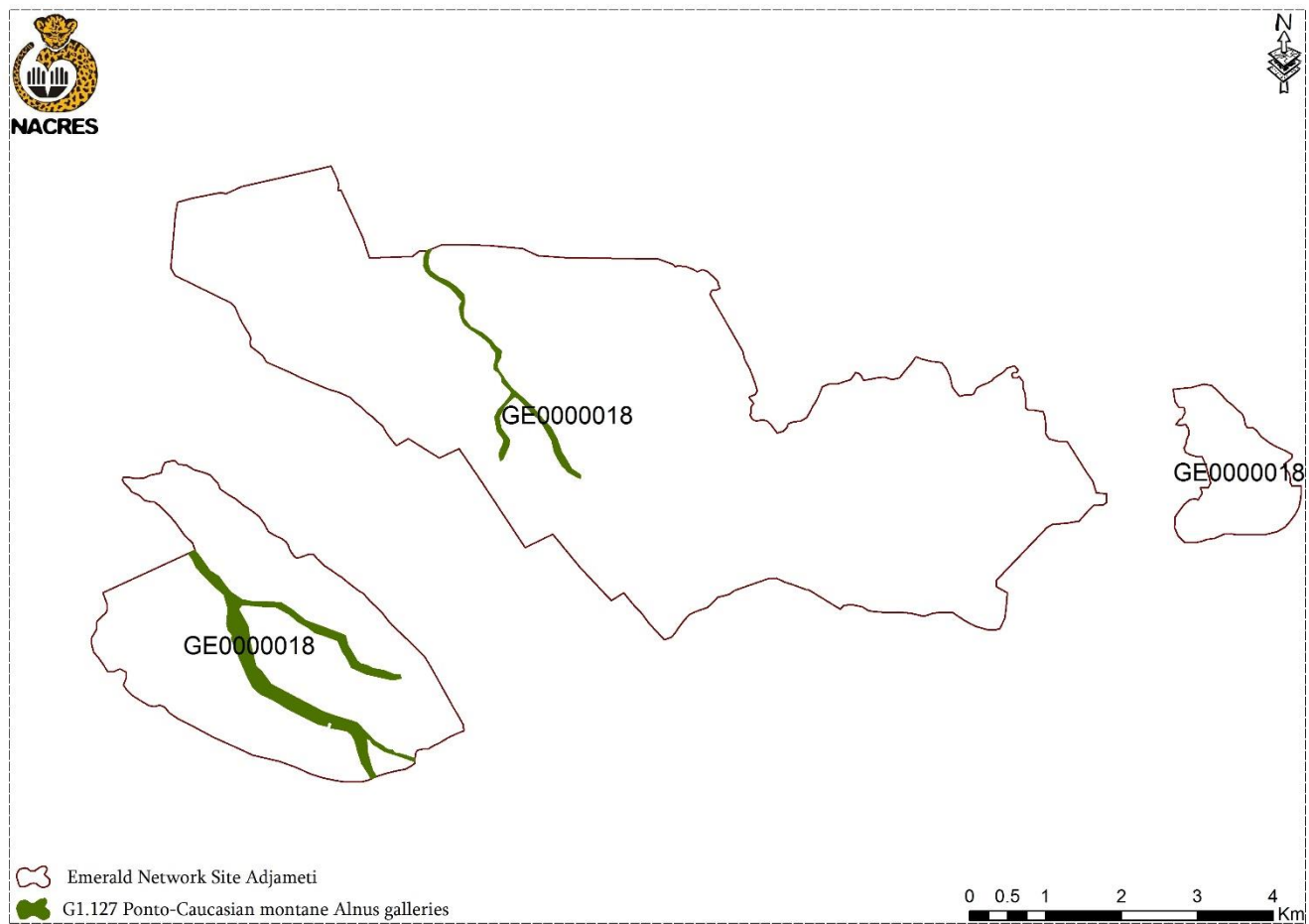


**Appendix 4. Habitat distributions inside and outside Emerald Network on the examples of Samegrelo 1 (GE0000021), Samegrelo 2 (GE0000057) and Svaneti-Ratcha (GE0000059) sites. Samegrelo 2 (GE0000057).**

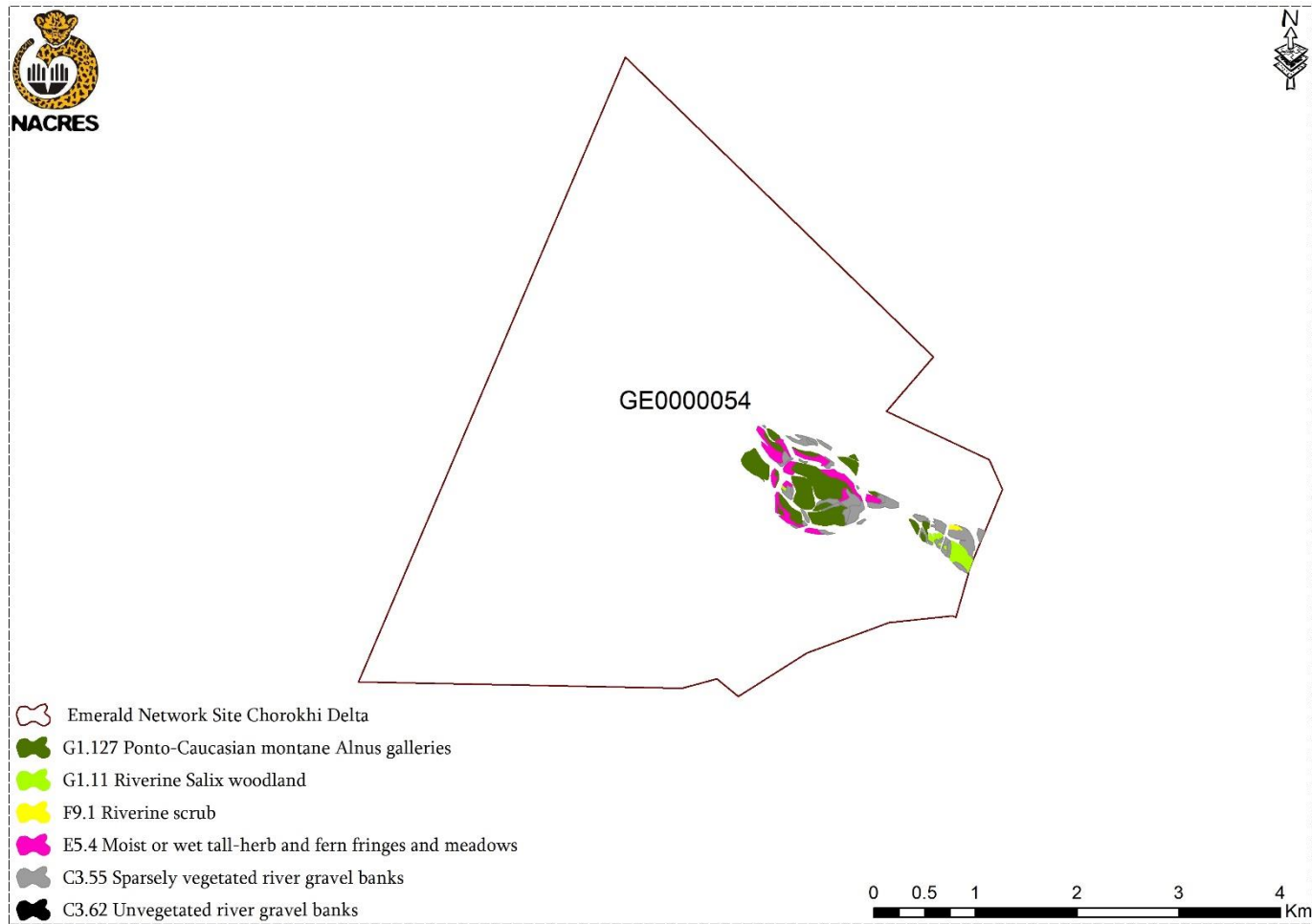


## Appendix 5. Habitat Distribution Maps

Habitats distribution map on Ajameti (GE0000018).

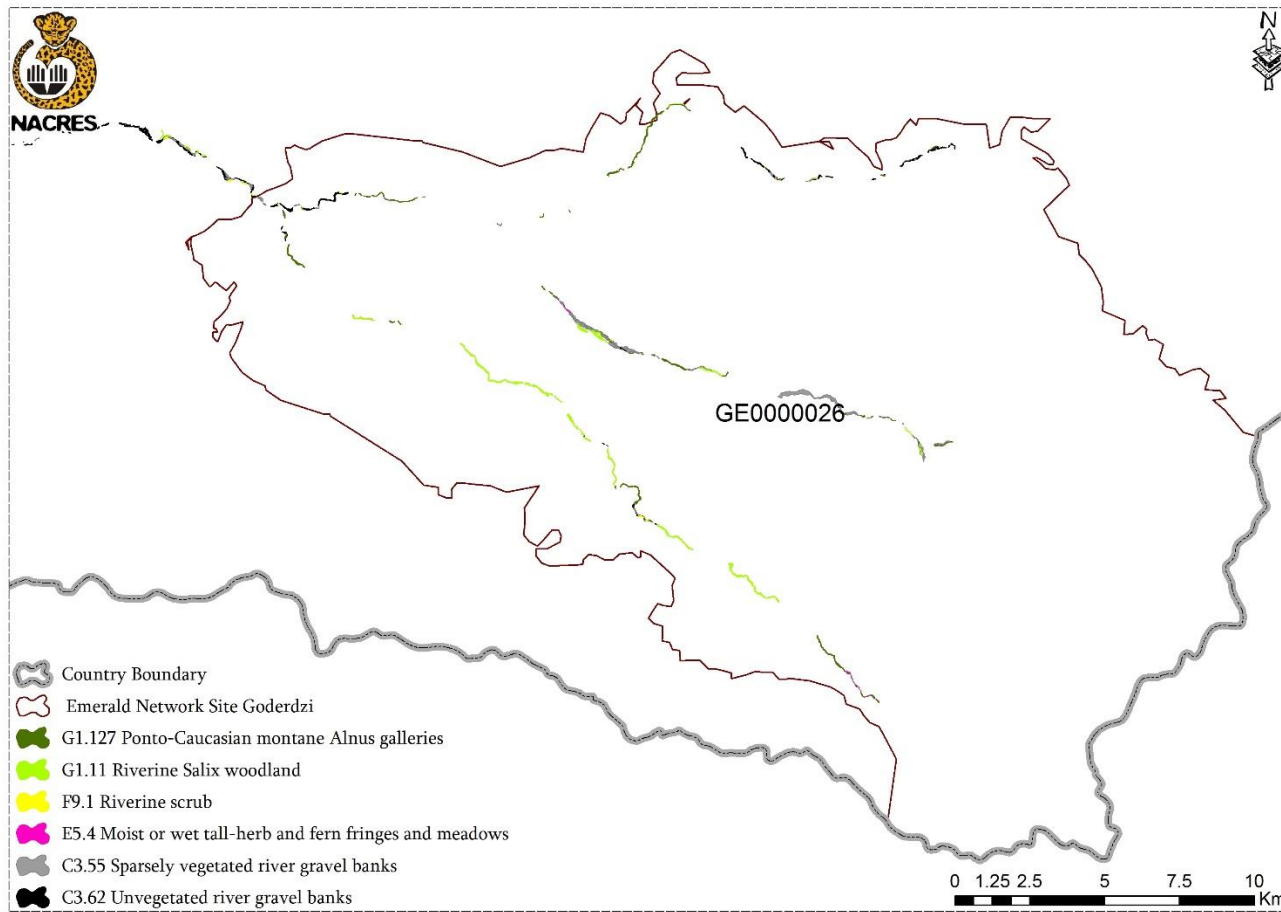


Habitats distribution map on Chorokhi delta (GE0000054).

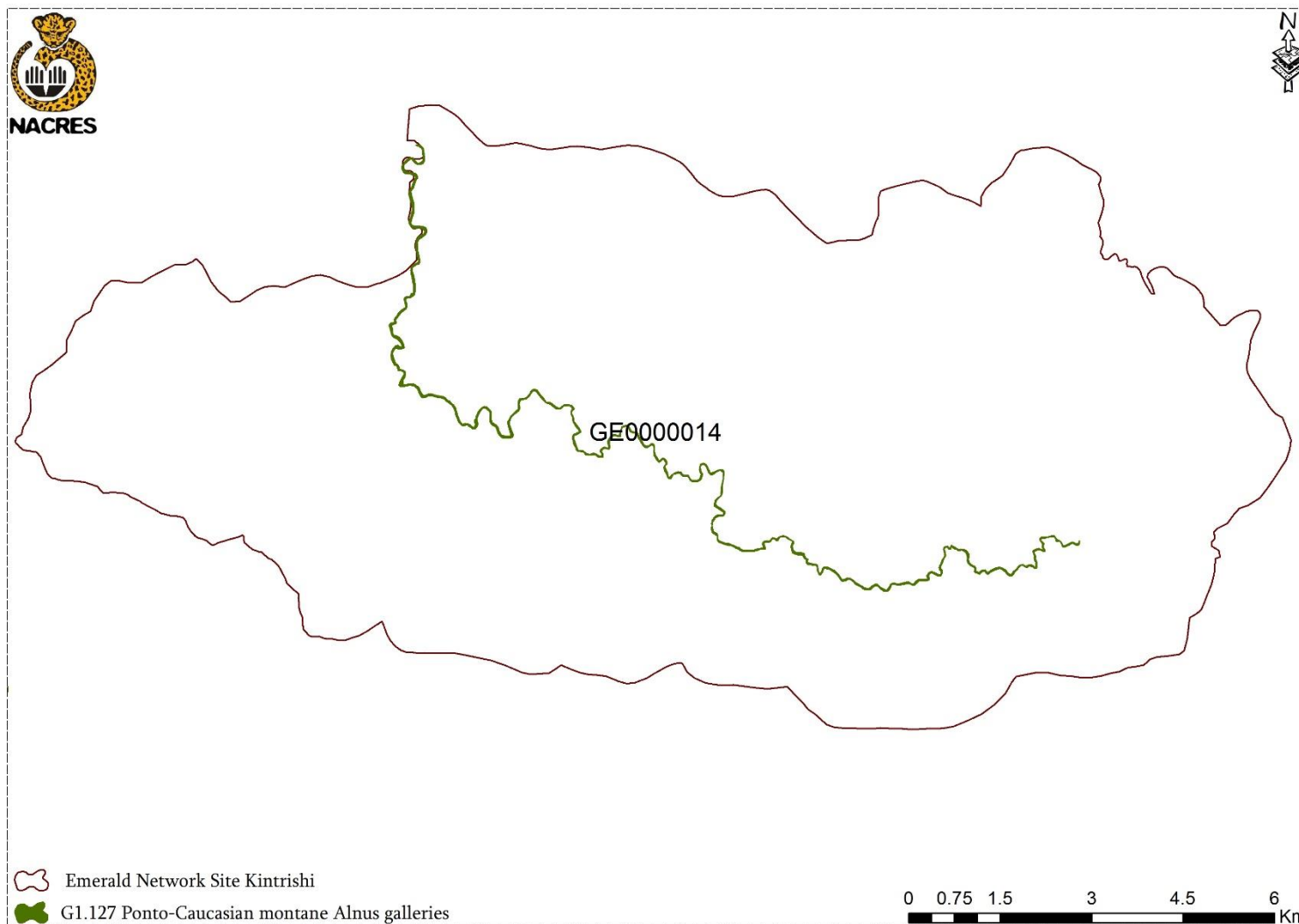




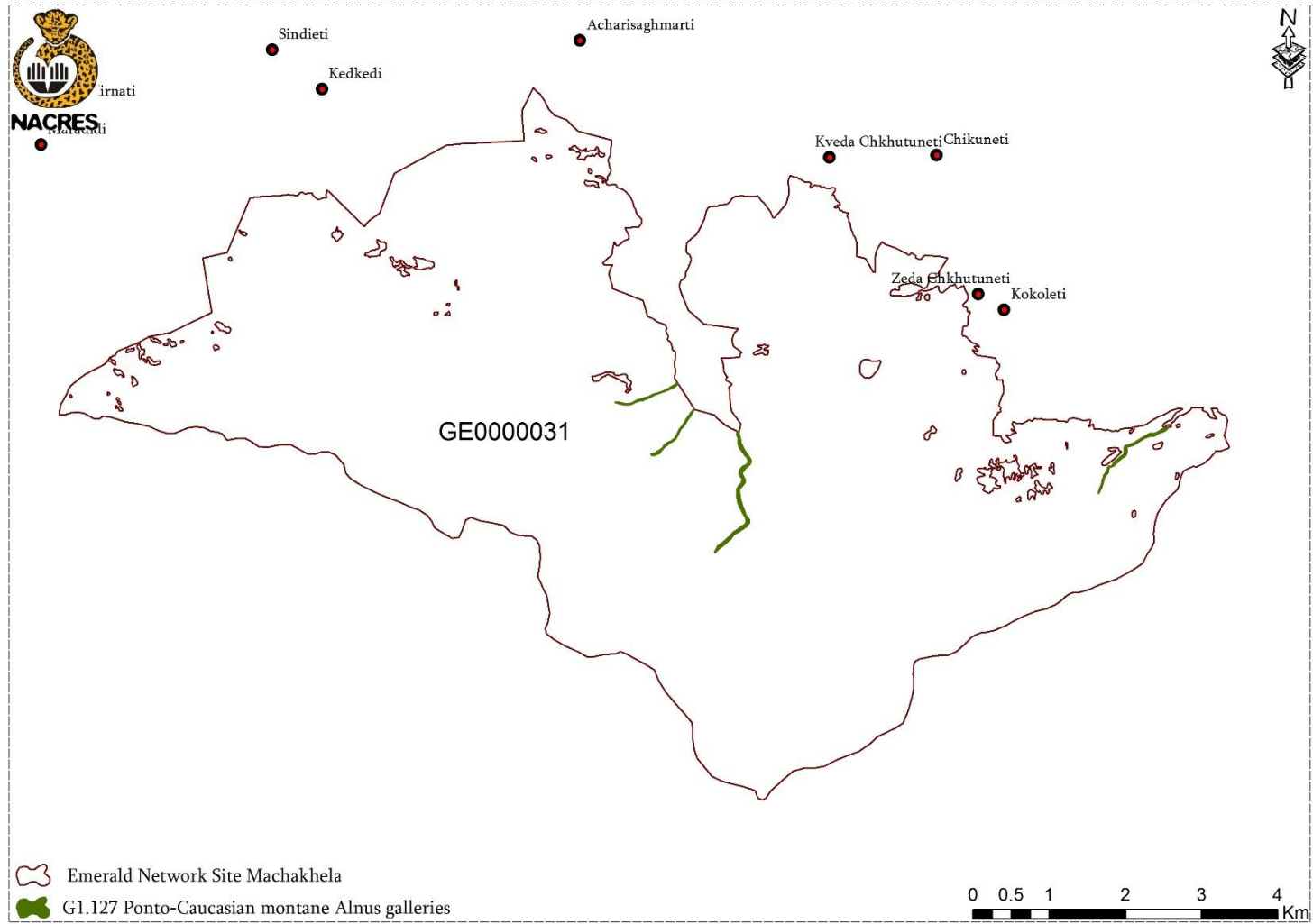
Habitats distribution map on syte Goderdzi (GE0000026).



Habitats distribution map on syte Kintrishi (GE0000014).

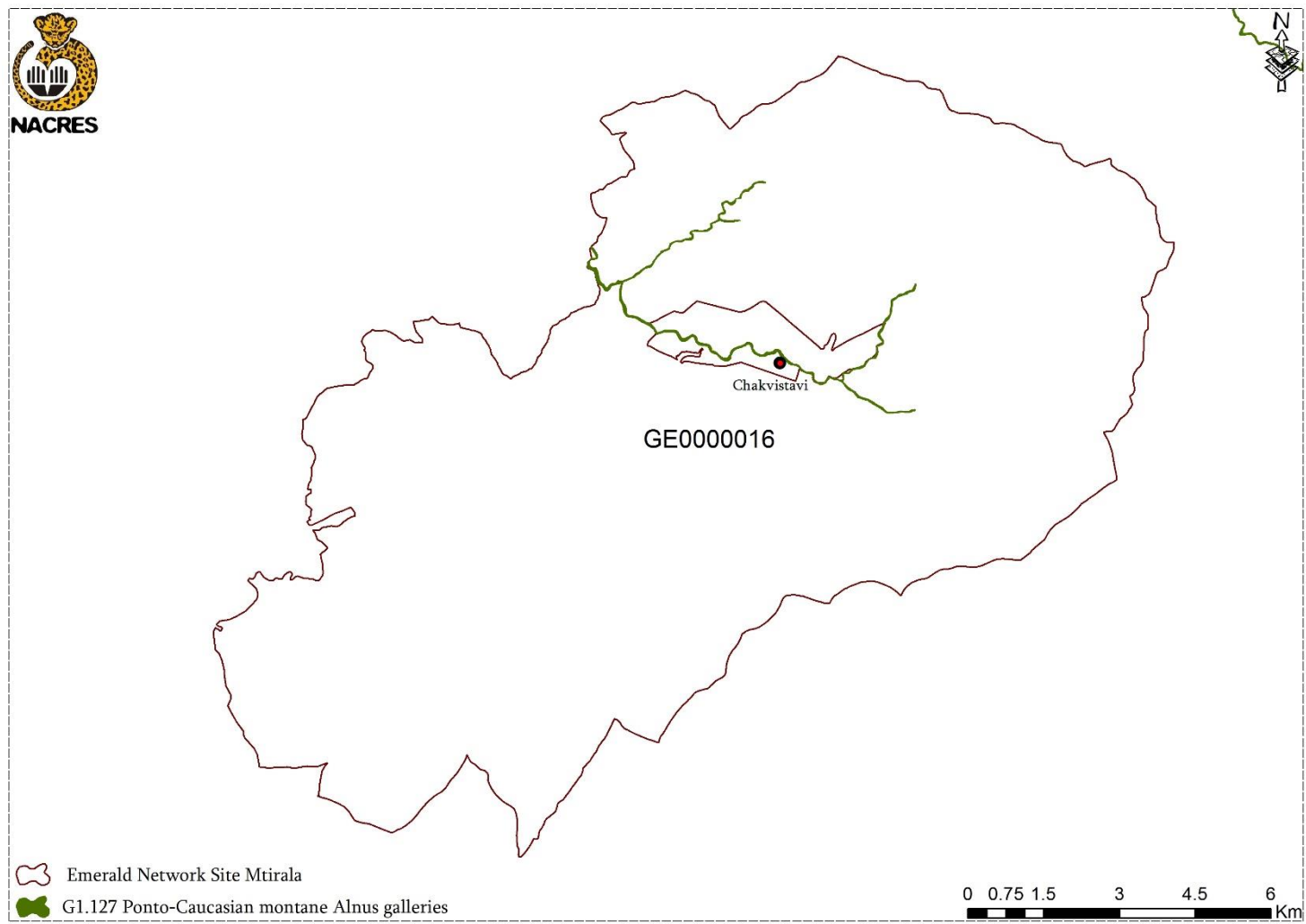


Habitats distribution map on Machakhela (GE0000031).

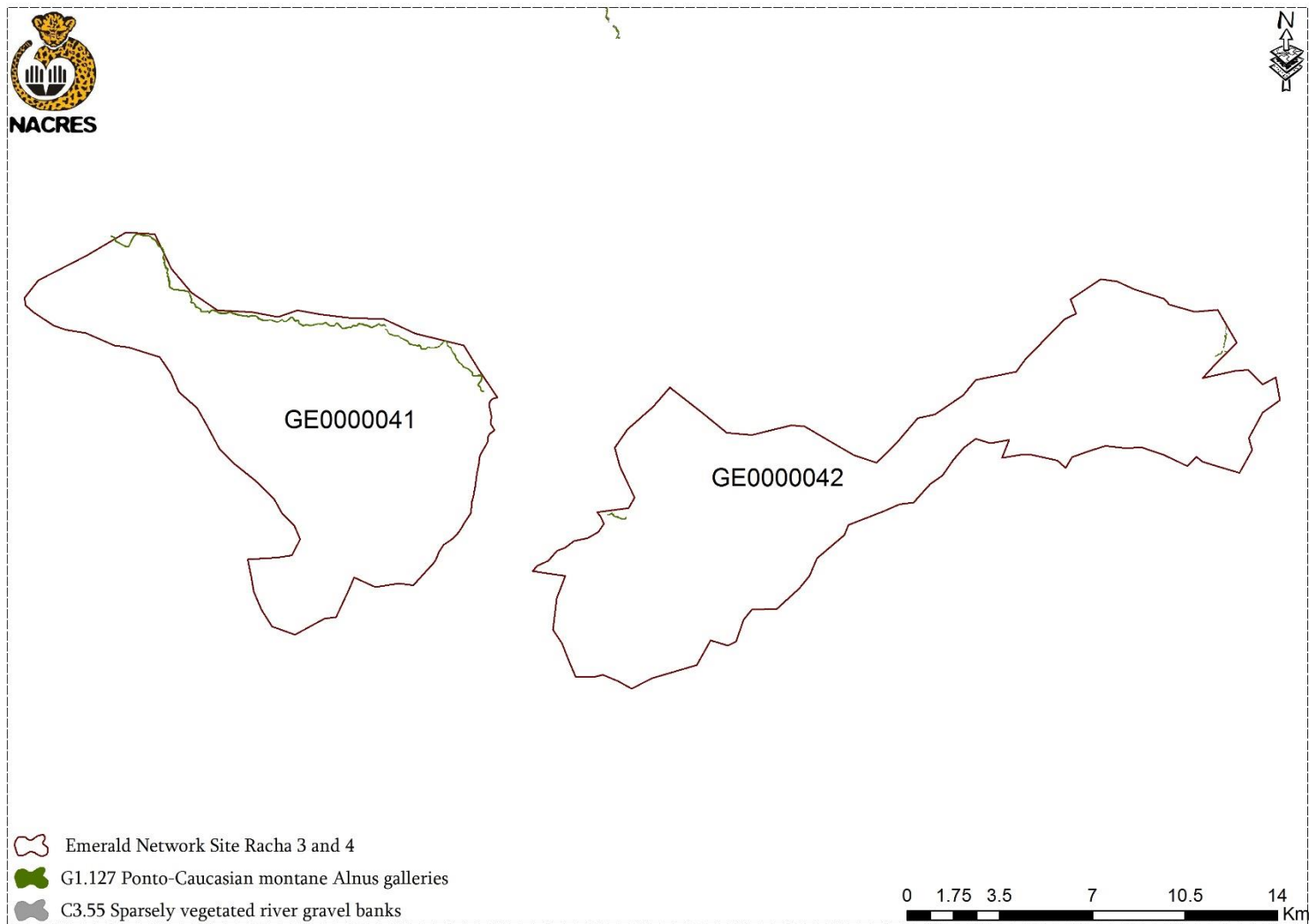




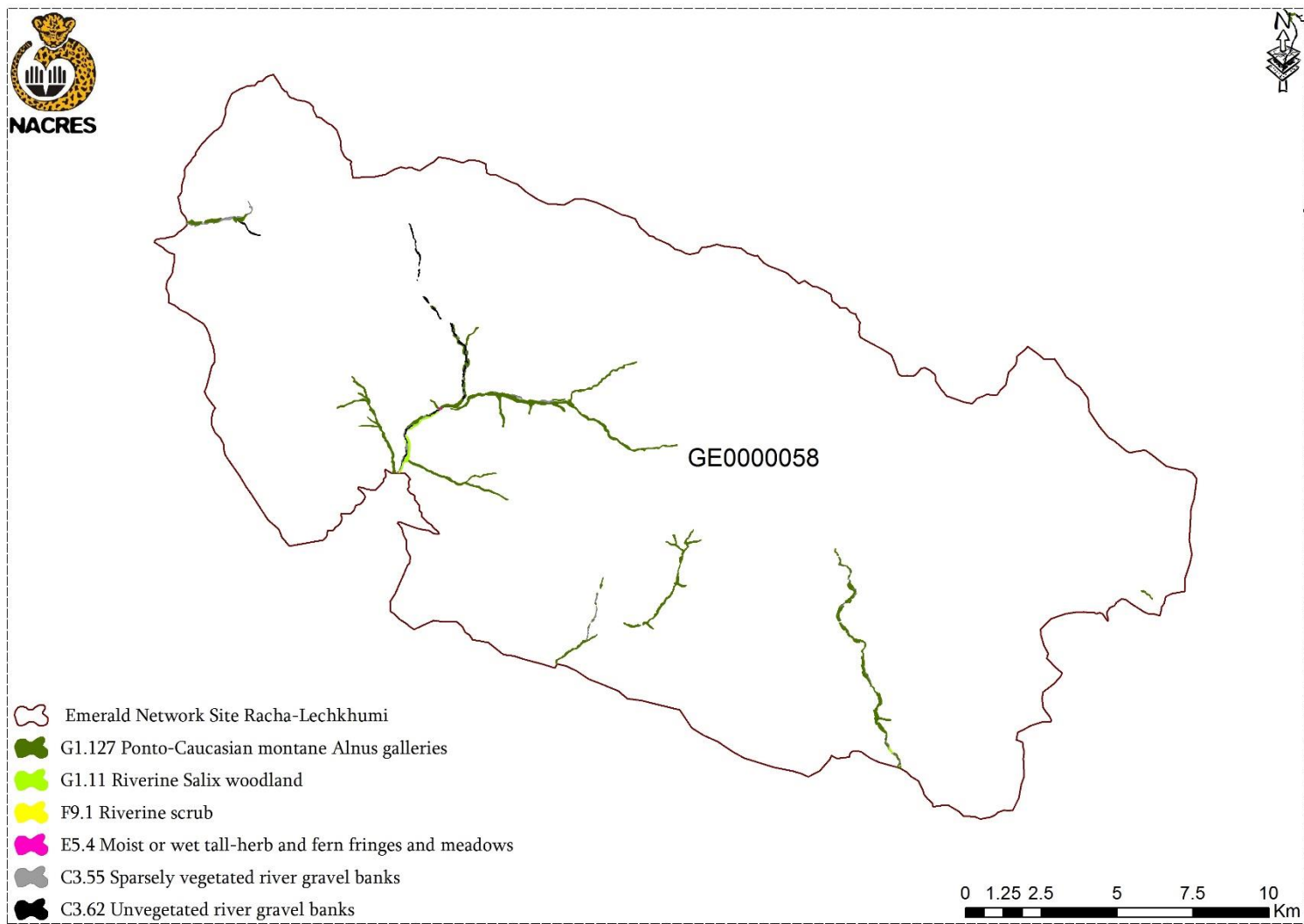
Habitats distribution map on Mtirala (GE0000016).



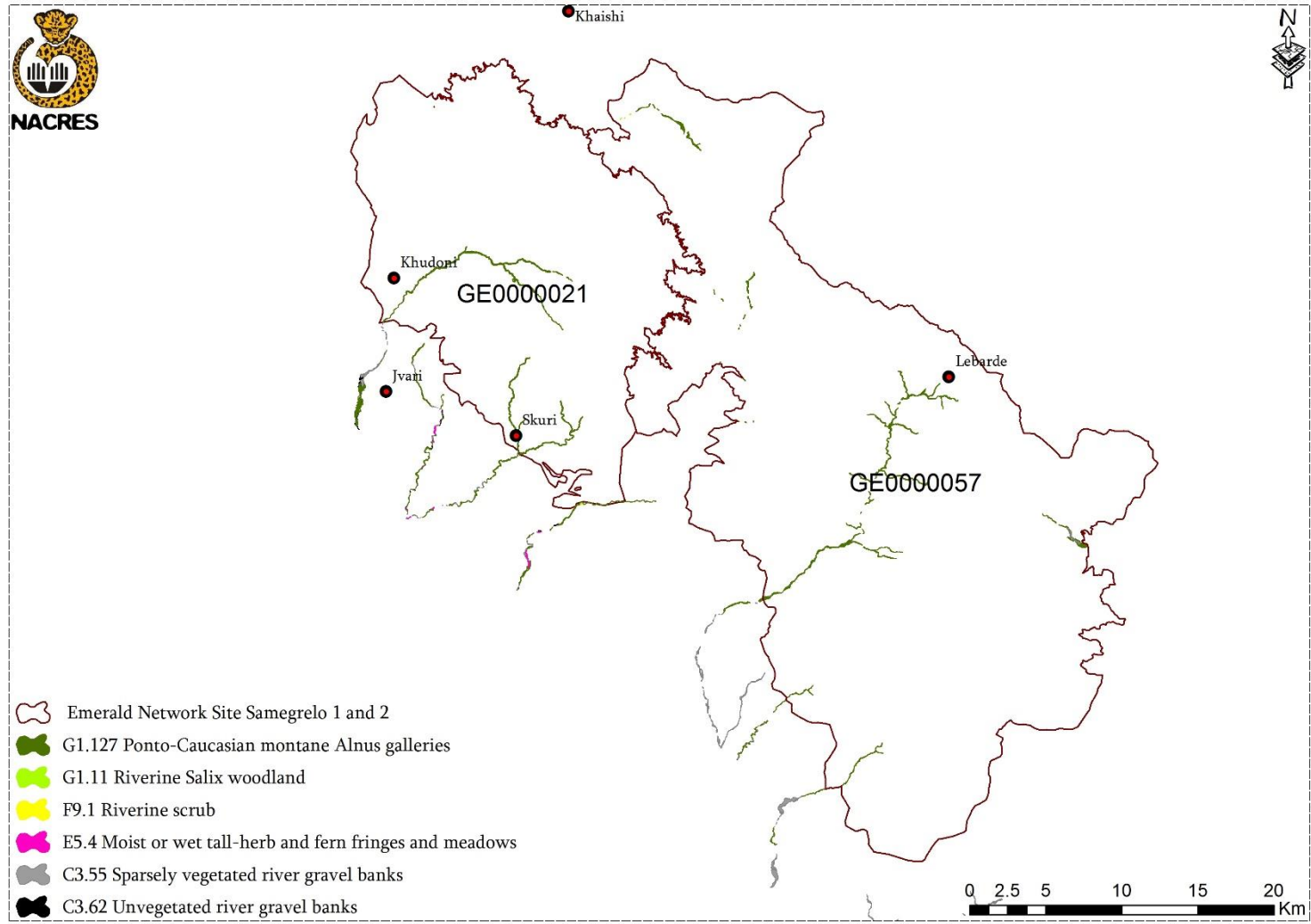
Habitats distribution map on Racha 3 (GE0000041) and Racha 4 (GE0000042).



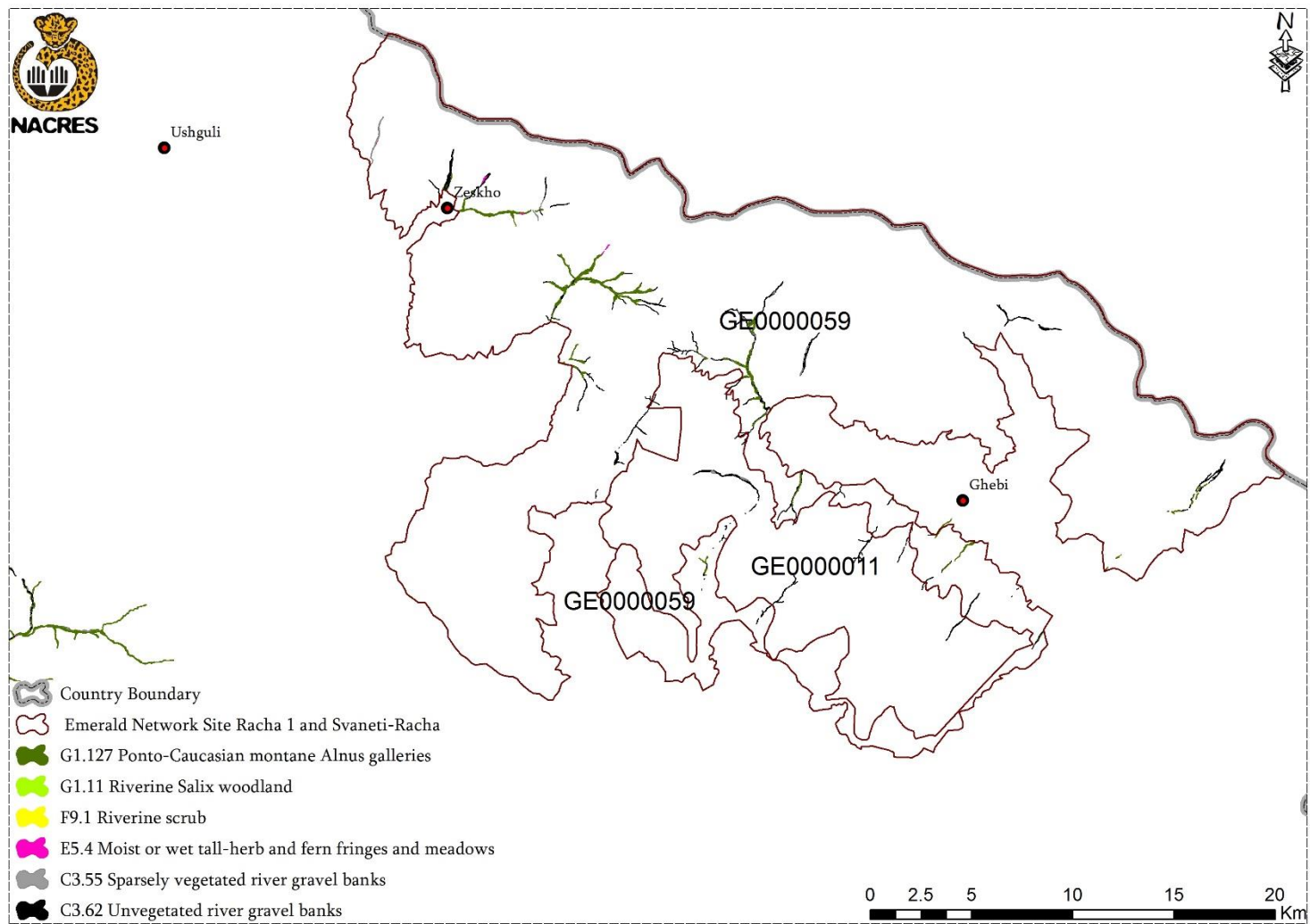
Habitats distribution map on Racha-Lechkhumi (GE0000058).



Habitats distribution map on Samegrelo (GE0000021) and Samegrelo 2 (GE0000057).



Habitats distribution map on Chorokhi delta (GE0000054).







**Management of natural resources and safeguarding of ecosystem services for sustainable rural development in the South Caucasus - ECOserve**

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