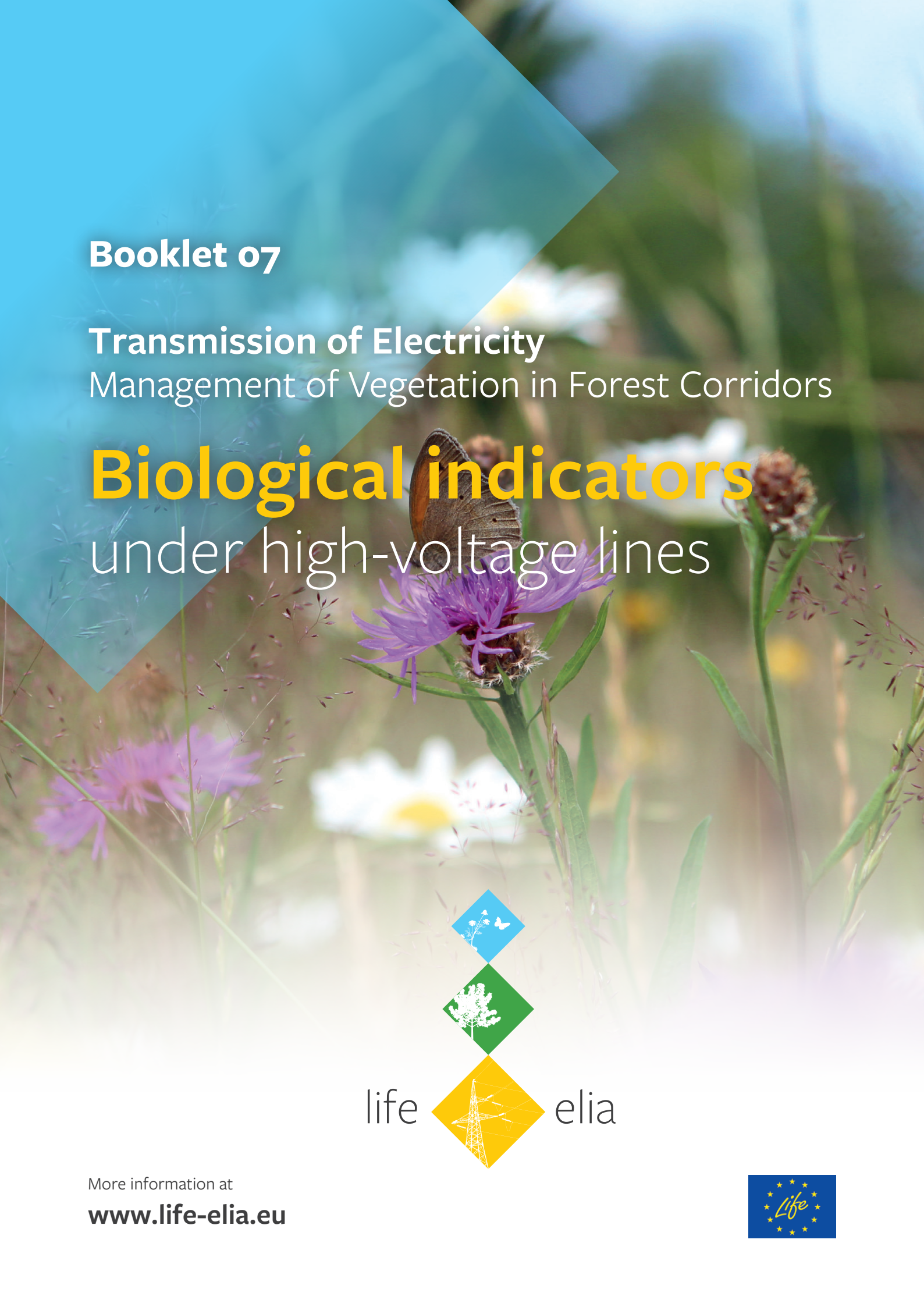

Booklet 07

Transmission of Electricity
Management of Vegetation in Forest Corridors

Biological indicators under high-voltage lines

life elia

More information at
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Introduction

This booklet was written by the staff of LIFE Elia-RTE (2011-2017), a project financed by the LIFE programme of the European Union, by the Walloon government, by Elia and RTE, the latter two electricity Transmission System Operators (TSO) in Belgium and France, respectively.

The main goal of the project is the transformation of the forest easements of high-voltage transmission line routes into ecological corridors in Belgium and France. Restoration activities aim at implementing innovative practices for management of vegetation of these green corridors in the forest, and raising awareness of various audiences about the importance of biodiversity in these linear habitats.

In order to objectify the impact on biodiversity of these vegetation management practices, inventories were taken throughout the project to measure the evolution of biological indicators. This booklet discusses the lessons learned from biological inventories taken during the 6 years of this LIFE project.

2

Management of vegetation under electricity power lines

When high-voltage lines cross through a forest range, the issue of safety becomes paramount. No tree can touch or get too close to the electricity wires. This challenge is detailed in booklets published by LIFE Elia-RTE.

As alternatives to conventional management of vegetation by mulching, the LIFE Elia-RTE project has implemented various actions detailed in the preceding booklets (booklets 3, 4, 5 and 6) in order to ensure electrical safety and also to promote biodiversity. These actions have also been proven to be economically beneficial (booklet 2).

Effects of management by mulching

Example of alternative management: grazing

3 Biological inventories

Assessing the impact of an action on the natural environment can be done by studying bioindicator species.

A bioindicator species is a living organism, animal or plant, whose presence or absence in a given location at a given time gives us information about the quality of the environment in which the inventory is carried out.

On the basis of very good knowledge of the biology and distribution of some of them, ecologists often use birds, higher plants, dragonflies or day butterflies.

When taking biological inventories, the operator will inventory species from these different groups present on the site to be studied by following a very specific protocol. **By repeating these same inventories over time, it will be possible to quantify the general evolution of the quality of the natural environment.** Thanks to certain works of ecological engineering, it is possible to observe the appearance of new species or the strengthening of populations already present.

3.1. Objectives of biological inventories

Biological inventories can serve different purposes:

- assessment of an initial state "t0" before the work,
- assessment of the impact on nature of development work, new construction or an accidental event,
- scientific research on sites of great biological interest.

3.2. Tracking indicators in the LIFE Elia-RTE project

Under the LIFE Elia-RTE project, the goal of tracking biological indicators is clearly assessing the impact on animal and plant species for the creation/restoration of natural habitats and for a change in the method of managing vegetation in the electrical corridor.

3.2.1. Target groups

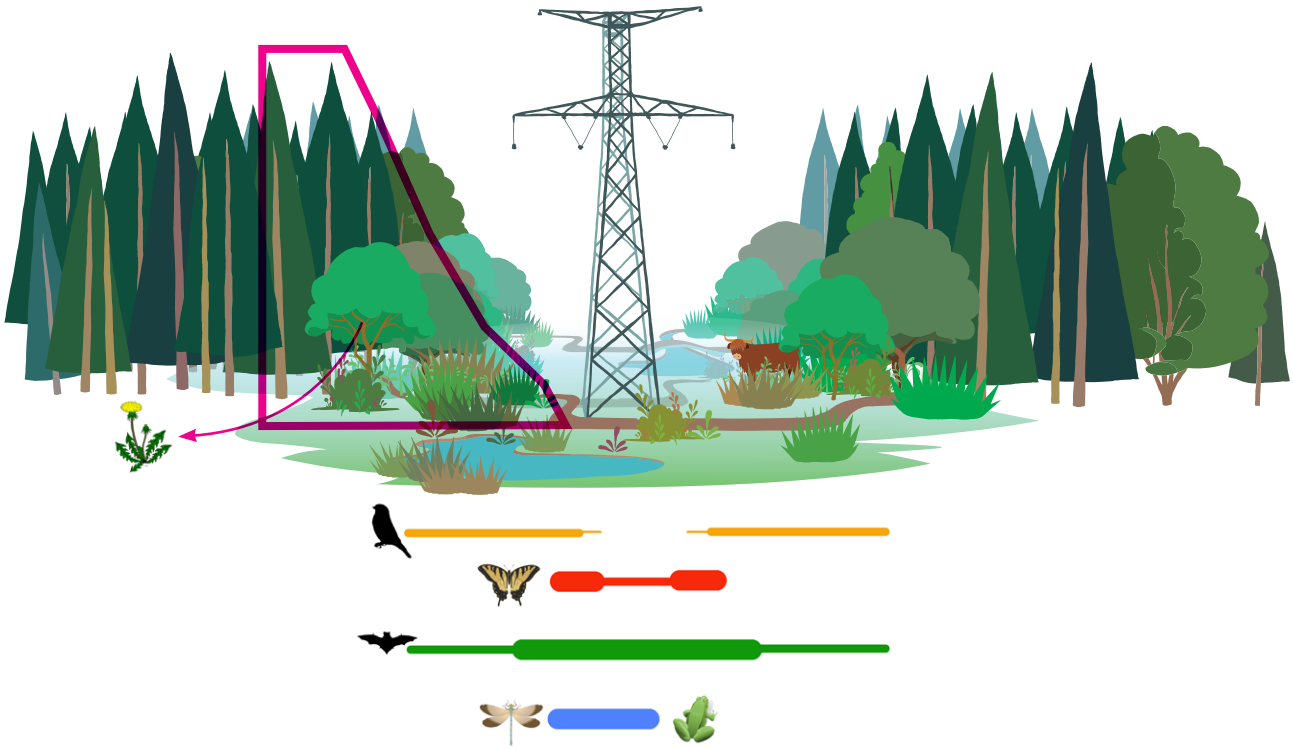
The groups taken into account in tracking biological indicators for the LIFE Elia-RTE project are:

- higher plants
- birds
- day butterflies
- dragonflies
- reptiles
- amphibians
- bats

The choice of groups to be inventoried and the frequency of these inventories involve different parameters:

The adequacy between the type of organism and the habitats concerned

The table below shows the value of observing a group according to the types of actions carried out.



	Edge	Orchard	Peatland Moor	Pond	Invasive	Mowing Grazing	Flowery meadow
Birds	x						
Butterflies	x		x			x	x
Dragonflies			x	x			
Reptiles	x		x			x	x
Amphibians			x	x			
Bats	x		x			x	x
Botanical	x		x			x	(x)
Reaction time of actions	Slow	Slow	Slow; Rapid if tillage	Rapid	Variable	Intermediate	Rapid

- **time scale:** since animals are more mobile than plants, they will react more quickly to a habitat restoration action, while tracking of vegetation is to be taken into account over a 5 to 10-year time scale;
- **area to be considered:** in general, invertebrates are more typically studied in habitats with a reduced area as opposed to birds or mammals (including bats) which respond to larger scale habitats (borders and associated forest ranges).

Technical and human constraints related to inventoried groups

The investment of time and the cost of inventories depends on the equipment necessary and the availability of specialists.

Studying the flora, day butterflies, dragonflies, reptiles and amphibians can be done with inexpensive equipment: butterfly net, kick net, etc. These groups are also generally well known to naturalists.

For the birds, a good pair of binoculars is useful but it is especially the experience of the ornithologist that ensures the quality of an inventory.

On the other hand, studying bats is being fully developed and provides innovative data but it depends on the purchase of equipment that can be costly and generates data that is difficult to analyse and for which validation can only be done by a limited number of specialists.

3.2.2. The natural region

Certain natural regions are known to be intrinsically richer in biological diversity. This information must be integrated in the inventory effort. On the other hand, the same type of plant formation (forest, grassland, moor,...) will have a slower rate of development at a higher altitude and can therefore inventoried less frequently.

Brown Azure (*Aricia agestis*)

Entomological inventories (insects)

3.2.3. The importance of inventories at t0 (time zero = initial time)

When assessing the evolution of a habitat or a species, it is essential to carry out an inventory at t0, time 0. This represents the initial state, before any form of intervention (before the work of ecological restoration, improvements or a change in management method).
It is therefore necessary to plan these first t0 inventories prior to the first work, without which it will not be possible to accurately measure the effect of the work on the fauna and flora.

3.2.4 The inventory protocol

Even before the first t0 inventory, a simple and repeatable protocol must be written down in order to be able to carry out new comparative inventories in the future, possibly by other persons.

This protocol can be adapted during t0 based on realities in the field, but it must be scrupulously followed by subsequent inventories to allow valid comparison of the results obtained before and after the work.

3.2.5 Selection of sites to be inventoried

Depending on the resources available under the LIFE Elia-RTE project, a selection of sites to be inventoried was made from among all the LIFE sites (28 in Belgium).

The choices made covered sections of electrical power transmission lines:

- affected by major developments (tillage, digging ponds,...) aimed at restoring or creating habitats of high biological value,
- situated in several natural regions,
- accessible and near, if possible, to other sites to limit travel. Indeed, the distances between two inventory points are considerable along linear infrastructures such as the electrical grid,
- taxonomic groups to be inventoried.

Extracts from the inventory protocol for Butterfly surveys

The inventory point

Distribute an inventory point along the forest corridor every 500 m. The precise point is decided in the field depending on the accessibility and quality of the habitat and listed on a map or using a GPS.

Putting into practice

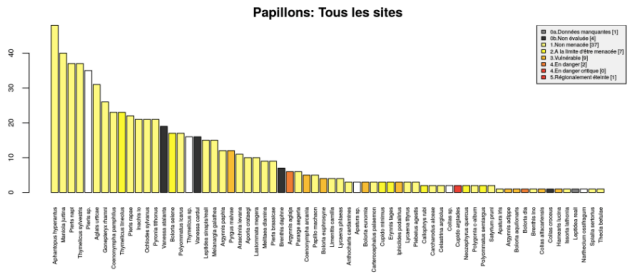
A two-person team travels through the line's forest corridor along its entire width, that is, a parallel round-trip on each side of the line every 100 m. (...). In order to minimize the bias of double counting, the two members of the team communicate with each other as observations are made, which are noted by one of them. (...).

Timing and weather conditions

The routes will be travelled between 10am and 6pm, under a cloud cover not exceeding 75%, without rain and with no or low wind. The minimum temperature should be 13°C if the weather is sunny or slightly cloudy (sun or some clouds) or 17°C if the weather is cloudy (10-50% coverage). A total of 3 sampling periods, spaced 15 days apart, will take place during the year.

The results from the LIFE Elia-RTE

To consult all the results from the LIFE Elia-RTE biological inventories, go to http://lifeelia.github.io/Monitoring/Bilan_Indicateurs.html



4 Contribution of tracking species

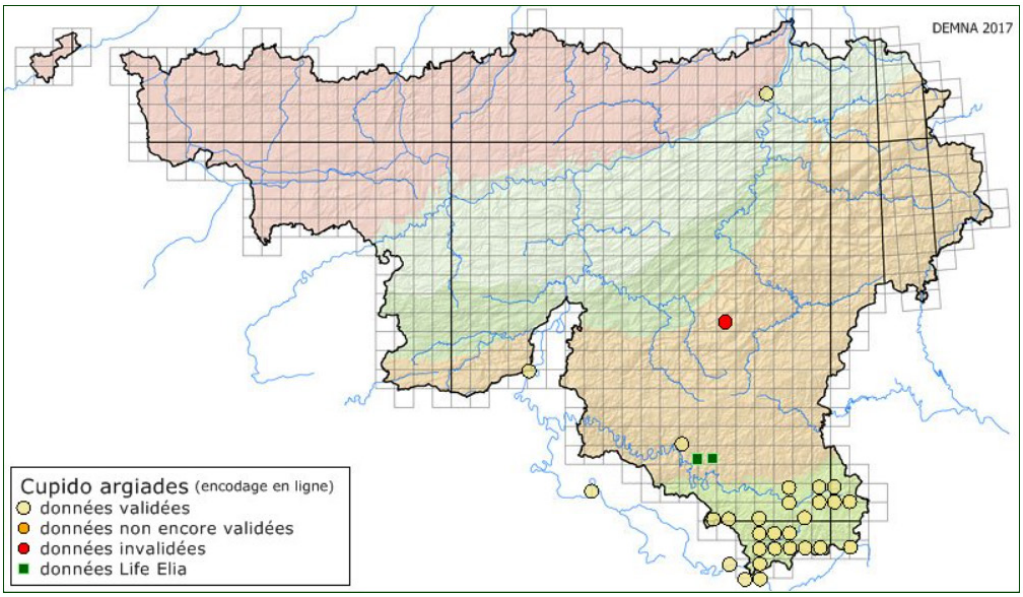
Aside from the assessment of the results of ecological restorations or changes in management methods, tracking species can present other interests:

- (Re-)orienting management: the discovery of great botanical wealth can, for example, lead to a reflection on the time and repetition of mowing, possibly facilitated in its implementation by granting agro-environmental measures.
- The discovery of sites that are very interesting from an ecological point of view but unknown to the scientific and naturalist community, and therefore not benefiting from any protection status (Natura 2000, nature reserve,...)

One of the many orchids, the fly orchid (*Ophrys insectifera*), discovered on an unprotected site and not known to scientists and naturalists

Marsh clubmoss (*Lycopodiella inundata*)

- A contribution to the knowledge of the geographic distribution of species, whether rare or not. In Wallonia, and as part of the LIFE project, the data were for this purpose encoded on the public platform developed by the administration's scientific department. They can be used later in the publication of atlases and red lists. In the French Ardennes, the marsh clubmoss (*Lycopodiella inundata*) (most observed for a century) and the *Carex binervis* have been recorded in peaty environments, following tillage.
- Development of the electrical grid as an avenue for colonisation of new territories for certain species. In Wallonia, the case of the Azure clover (*Cupido argiades*) and the Marbled Fritillary (*Brenthis daphne*) can be cited, two species of butterfly expanding towards the north.



Map of distribution of the Azure clover in Wallonia. In green, populations discovered under the electrical power transmission lines

5 Recommendations

At the end of the project, the following recommendations can be formulated in view of establishment of tracking indicators in a nature conservation project, and more specifically in linear contexts:

- Target the objectives of tracking indicators and the resources (human, financial and time) available and then choose one or more groups to study.
- Take account of the reaction time to certain developments or work.
- Take into account the conformation of a narrow linear space to choose the groups to be inventoried. Thus, the creation of bird listening points under the electric power lines provides more information on the populations present in the forest ranges on either side of the line than on the species present under them.
- Learn about any authorisations for capture to be obtained before beginning any inventory. These provisions vary according to the location (protected site or not, region or country) and the protection status of the species.

Tracking the populations of reptiles

The method consists of depositing pieces of black material about 1 m², along the border of electrical corridors, ideally on the side most exposed to the sun. Reptiles seeking warmth will find refuge under these plates, especially at the beginning and end of the day.

On a site in Belgium, we were able to follow colonisation of a restored dry moor as part of the project by the following reptiles: viviparous lizard, slow worm and ringneck snake.

LIFE Elia
Enhancement of the electricity transmission network's easements as active vectors for biodiversity

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The LIFE Elia project benefits from the co-financing of the LIFE+ tool of the European Union

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