SUMMARY REPORT A4

Study area

The study area concerns a total of 31 Natura 2000 sites in Emilia-Romagna, 22 survey sites for *G. bilineatus* and 14 sites for *C. mercuriale castellanii*. This extensive field operation involved simultaneously more than 10 entomologists in two annual growth seasons of 2016 and 2017.

The evaluation of the ecological functionality of the rivers, ponds and lakes for the purpose of the survey was carried out following the protocols specifically set up during the initial phases of the LIFE Eremita project.

For *G. bilineatus* transects were walked and identified on the basis of the presence of habitats suitable for the species that are fresh stagnant mesotrophic/oligotrophic fresh water, which is cold, limpid and permanent. Depending on the area of presence in its distribution area these waters are more or less rich in aquatic plants, in particular of *Phragmites* sp., but also *Nupher* sp, *Nymphaea* sp., *Menyanthes* sp., *Myriophyllum* sp., *Utricularia* sp., and differ in the degree of sun exposure. The species can also live in small pools (less than 5 m wide) and in channels with adequate depth (Franciscolo, 1979; Hájek, 2004; Cuppen *et al.*, 2006; Hendrich & Spitzenberg, 2006; Koese *et al.*, 2008; Mazzoldi *et al.*, 2009; Hendrich *et al.*, 2012; Trizzino *et al.*, 2013).

For *C. mercuriale* transects were walked and identified on the basis of the presence of habitats suitable for the species that are running waters, slow, even cold, in particular of streams and spring with a dense riparian and semi-submerged vegetation.

In relation to the extension of the body of water, the sampling was carried out walking slowly on several transects, chosen randomly or on the basis of some variables (e.g. plant cover) and of the possibility to walk along the bank. In the counting method, notes were taken of all the adult specimens spotted along the transects. During the counting of the specimens a mechanical or digital counter was also used, and only specimens necessary for the identification of the species were captured with a dragonfly net and immediately released. To verify the suitability for the species of each watercourse, its main morphological and ecological characteristics have been described in the field sheet, and also the factors deemed as limiting have been taken note of. All monitoring phases are documented and photographed. The gathered data were collected on special field sheets, subsequently uploaded to the project information system.

The monitoring methods used were the count (VES) and capture-mark-recapture (CMR) of adult specimens (Thompson *et al.*, 2003; Watts *et al.*, 2007; Hassall & Thompson, 2012; Rovelli *et al.*, 2016), following a monitoring protocol specifically written within the Life project.

For both species, the measurements were made by an expert entomologist, covering the transects. The suitability assessment was carried out in the field on the basis of the morphological and ecological factors listed on the survey card, expressing them on a scale of values ranging from high, to medium, low and no suitability, according to the judgment of the surveyor.

All the data collected on the field survey cards were subsequently uploaded to Excel archives and inserted into the project databases.

Results

Coenagrium mercuriale castellanii

Data was catalogued on the ecological function of 79 rivers on 79 transects in the 14 Natura 2000 sites that were investigated. Each river was assessed on the basis of its suitability to host the species and was mapped with a chromatic scale: green= high suitability; orange= medium suitability; yellow= low suitability; black=no suitability.

Graphoderus bilineatus

Data was catalogued on the ecological function of 123 basins on 123 transects in the 22 Natura 2000 sites that were investigated. Each basin was assessed on the basis of its suitability to host the species and in this case also it was mapped using the same chromatic scale as for *C. mercuriale castellanii*.
In the following Table, data are summarized according the suitability of habitat basins and rivers.

Species	**Natura 2000 sites (N)**	**Transects (N)**	**Habitat rivers/basins registered (N)**	**High suitability (N)**	**Medium suitability (N)**	**Low suitability (N)**	**No suitability (N)**
Coenagrium mercuriale castellanii	14	79	79	0	13	13	53
Graphoderus bilineatus	22	123	123	25	15	15	68

Conclusions

Thanks to the extensive field operation that was carried out, it was possible to identify and map the suitable basins and rivers of the two target species of the Life Eremita project on a large-scale.
The effort put forth in the 31 Natura sites of the region represents the first survey of this magnitude carried out in Emilia - Romagna, both in terms of territorial extension and in terms of precise return of technical results (number of basins and rivers individually assessed to determine their ecological functionality).
The results of this analysis confirm, for both species, the scarce presence in both habitats of conditions favourable to the expansion of their distribution area, due to the rarity of suitable basins and rivers.
The survey has prepared a catalogue with the number of evaluated basins and rivers (123 for *G. bilineatus* and 79 for *C. mercuriale*) in terms of ecological functionality, mapped on a GIS basis, which can be used to speed up processes of natural senescence or intervention ex-novo to create conditions that can favour habitat expansion for the two species.