SUMMARY

The main challenge for conservation biology is to understand how species use the available resources as well as what their habitat requirements are. Globally increasing habitat fragmentation, habitat loss and degradation negatively affect the occurrence of many species, including pollinators, which results of lower efficiency of ecosystem services. In order to take effective conservation actions there is a need to know the habitat requirements of both endangered and umbrella species, the key resources required during their life cycle and movement abilities of these species. Knowledge of the factors supporting or limiting the effective colonization of unoccupied habitat patches is also essential for conservation programs.

The dryad butterfly *Minois dryas* is a model species in my PhD thesis. It inhabits two contrasting habitat types: *Molinietalia* wet meadow and xerothermic grassland with steppe plants typical for communities of *Festuco-Brometea*. Until recently, the Skołczanka Reserve in Kraków constituted a regional refugium of the species from which the dryad has spread into adjacent wet meadows. My PhD thesis has the following objectives: (i) determining how the butterfly uses the available resources in contrasting habitats in two spatial scales: habitat patch scale and landscape scale, (ii) understanding its within-patch mobility and (iii) obtaining knowledge on the key factors affecting the colonization of unoccupied patches.

In the first chapter, at two selected xerothermic grasslands and two wet meadows I study habitat preferences of the dryad: selection of microhabitats within the patch; feeding preferences towards selected groups of plants with flowers of radial and dorsiventral symmetry, Dipsacaceae with Asteraceae and Apiaceae; and feeding time on the aforementioned plant groups. I also examine the effect of different habitat components, microclimate conditions (Ellenberg indicators) and plant species assemblages. Butterflies preferred places close to shrubs and avoided feeding on invasive goldenrods *Solidago*. Thermal conditions and the availability of nectar plant limited the selection of microhabitats by the dryad at wet meadow. At xerothermic grassland, the dryad preferred higher vegetation as resting places. Feeding time was longer in wet meadow. Grasses achieved larger cover at wet meadow, while nectar plants did so at xerothermic grassland. Results indicate that xerothermic habitat is better for the dryad in terms of nectar resources, whereas wet meadow is better in terms of larval food-plant availability. Maintaining a mosaic of both wet and xerothermic meadows located close to one another may be a favorable conservation strategy for the dryad.

In the second chapter, I compare flight-related morphological traits and within-patch flight distances of the dryad between its old populations occupying xerothermic grasslands and newly established ones at wet meadows. Since the individuals from the wet meadow

populations are descendants of dispersers from the xerothermic grasslands, it could be expected that they are more mobile, which should also be reflected in their morphology, namely thorax width, and forewing length. Against the above expectations, we found no direct effect of habitat type on movement distances covered by the butterflies. Moreover, while individuals living in both habitat types did not differ in their body mass, those from xerothermic grassland had wider thoraxes and longer wings. Most of the flight distances were shorter than 10 m. Such results suggest that the dryads from xerothermic grassland have better flight capabilities, whereas those from wet meadows are likely to invest more in reproduction. My findings imply that mobility in the investigated species is determined by environmental characteristics rather than by its recent evolutionary history.

In the third chapter, combining classic approaches derived from the metapopulation theory and landscape ecology, I investigate the process of colonization of habitat patches by the dryad butterfly, progressing from a recent species refugium – the Skołczanka Reserve in Krakow. The study was done on 27 patches of xerothermic grassland and 26 patches of wet meadow. The tested predictors included factors reflecting the quality of habitat patches, their spatial structure, and parameters of patch surroundings. Colonization of patches by the dryad was strongly limited by the distance from the species refugium in the region. I also detected a slight positive effect of shrub density on the dryad occurrence. Butterfly abundance increased in smaller and more fragmented habitat patches; in addition, it was negatively impacted by invasive goldenrod cover, and positively affected by the density of watercourses in patch surroundings. Nectar plant availability was positively related to species abundance in xerothermic grassland, while in wet meadow the effect was the opposite. My results suggest the existence of source-sink dynamics in the investigated system. In order to protect the species the land managers should focus their efforts not only on preserving large patches but also aim at maintaining those small, more fragmented and with lower resource availability, because such habitat fragments are of great value both for the specialist species as well as for the biodiversity conservation, especially in urban areas.

Finally, I conclude that results obtained simultaneously from both local patch-scale and landscape-scale studies are more robust than those restricted to a single spatial scale are. The conclusions drawn from them can serve as a basis for the design of measures aimed at conserving target species and biodiversity.