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SPECIAL REVIEW

### Italian review of PhD dissertation in Ornithology (third edition)

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#### Introductory note

For the third year, *Avocetta* collected the abstracts of the PhD-Dissertations focused on Ornithology and defended in Italian Universities. In this case, we reviewed the theses defended between the 2016-2017 and 2017-2018 academic years. The aim of this collection is to offer a review of the research lines on which Italian ornithology is working and to offer visibility to young researchers that with their PhD contribute to the development of this scientific field. In this third review, only three theses were received belonging to two Universities. We did any effort to collect the abstracts of all the possible theses by contacting colleagues and by searching on the web. So far, even if we assume that some thesis may be passed overlooked to this review, the reduced number of PhD theses that we have received is per se a matter of concern for the European ornithological community. Despite the long-standing tradition of the Italian ornithology and its crucial role in the development of ornithology in the last decades, nowadays very few young researchers are getting their PhD in ornithological arguments in Italy. For a comparison, in Spain, in the academic year 2016-2017, 28 PhD ornithological thesis were defended (Varela 2017). Indeed, we are conscious that a much higher number of Italian ornithologists choose to realize their PhD abroad. Overall, we claim to increase the ornithological themes in the research lines of the Italian Universities, otherwise, without the incoming

of new researchers, the Italian ornithological community expose itself to a serious starvation risk in a proximate future.

Overall, the thesis reviewed in this collection spread over five major topics, not mutually exclusive: migration ecology (2 thesis), movement ecology (1), conservation suggestions (2), conflict of bird conservation in human landscapes (1), analytical lab methodologies (1).

All the three theses present results based on field-collected data, even if using remote tracking telemetry in one case. Some of the chapters of the thesis are already available as published papers, in which case are indicated in the reference list at the end of the review. Thesis are presented in alphabetical order following the name of University and of the PhD candidate surname. Contents of the abstract are not reviewed and are responsibility of the authors.

#### *Thesis 1*

#### **Biodiversity conservation in permanent crops and grasslands**

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Academic Year: 2015/2016

**Abstract**

In Europe, permanent crops and anthropogenic grasslands used to be the most important low-intensity semi-natural farmlands and were both negatively impacted by intensification and abandonment. Today most of these systems exhibit a very limited natural value.

In this thesis, I present a collection of studies on the effects of agricultural practices, land use change, and landscape structure on birds, which are reliable indicators of biodiversity and “umbrella species”, conducted in four typologies of permanent agricultural systems: vineyards, olive groves, fruit orchards, and hay meadows and at several levels of scale, from landscape to foraging sites.

The ultimate scope of this thesis is to inform possible best-management practices to favour bird conservation in man-made ecosystems. This is particularly urgent as permanent crops were excluded from any ‘greening’ obligations planned by the current CAP. Hence, the only possibility for developing conservation actions in these kinds of agroecosystems will be to demand agri-environmental schemes in the framework of national and regional plans.

My findings show that, in permanent crops, bird diversity and the abundance of individual species are driven by a multitude of elements related to the landscape, management, and topographic-climatic contexts. Considering the whole community, the landscape level emerged as the most important driver of biodiversity patterns, but some agricultural management traits also affect biodiversity; conversely, the abundance of individual species could be influenced not only by the landscape characteristics, but also by the significant, or even predominant, effects of climatic-topographic attributes and, especially, of management practices.

At the community level, the predominant land use throughout the landscape had negative effects on the community itself; this is also generally true for the most common species dwelling in those crops.

A relevant exception to this pattern was represented by three insectivores of conservation concern (i.e. common redstart, spotted flycatcher and wryneck), which are favoured by vineyard cover at the landscape scale likely because vineyards are structurally similar to their “ancestral” habitat. However, investigating the wryneck habitat selection at a finer spatial scale (i.e. territory), I showed that it is more affected by specific vineyard characteristics, which determined nesting site availability, than by general land cover traits.

Importantly, my results also point out a broadly positive effect on birds with the cover of habitats different from their dominant ones (e.g. marginal habitats) and with traditional elements (e.g. hedge and tree rows, isolated

trees, and buildings), which allowed for the persistence of species that are not adapted to the main habitat that characterise the matrix, since those species are unable to nest or forage in the crops.

From my models on communities, I estimated some reference values for the heterogeneity (number of patches of different habitats) and cover of marginal habitats for which the majority of community indexes displayed values above the respective average. I also investigated the effect of organic viticulture on birds by considering several indicators and spatial scales without finding any positive effect of this kind of management. Main causes for this are that organic farming was previously shown to exert much more positive effects in annual crop systems and in simplified landscapes, thus in agroecosystems quite different from vineyards. Additionally in the study area, organic and conventional management forms do not differ very much in terms of pesticide use or other agricultural practices. Based on these findings, I suggest that much effort should be allocated at a wider landscape scale in making organic viticulture more biodiversity-friendly.

In a conservation or planning framework, it is fundamental to identify the target (i.e. the whole community or a singular species) of a defined action. Indeed, if the primary needs of the majority of the species which constitute the community could be satisfied by acting at a landscape level, then some needs of individual species could rely mainly, or exclusively, on particular elements determined by agricultural management. As a consequence, to favour these particular species, these elements should be conserved or restored.

This study closes some knowledge gaps on biodiversity in permanent crops and, to a lesser extent, on Alpine hay meadows; however, a number of questions still remain; hence, in the last part of the thesis, I briefly address some possible future research directions.

*Thesis 2*

**Animal ecology through stable isotope analysis**

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Academic Year: 2015/2016

**Abstract**

Stable Isotope Ratios techniques raised in the last thirty years as a novel approach very useful for researchers and

ecologists that intend to deepen into manifold aspects of animal ecology. In particular, isotopic ratios in animal tissues ultimately reflect diet, and the isotopic composition of diet reflects biogeochemical attributes of environments that may, in turn, show spatial structure and pattern, both at local and continental scale.

Here, SIRs techniques were applied to birds, and, in particular, the stable isotope ratios of hydrogen, carbon, nitrogen, oxygen and sulfur were determined in bird feathers.

The study was articulated in three different case studies. In the first two studies, SIRs technique was applied to migratory birds, sampled during post-breeding migration on Italian Alps. In particular, feathers were sampled on juvenile Passerines captured in some ringing stations of 'Progetto Alpi' long-term monitoring project. The focus was put both on commonly and less commonly observed species (more than 800 individuals of 48 species). The first study aimed to determine the geographical breeding origin of migrants using the stable isotope ratios of hydrogen and oxygen. The study allowed 1) to perform an analyses on the relationship between hydrogen and oxygen isotope ratios of several species, 2) to verify whether migratory populations have distinct geographical origins, different timing of passage and a comparison between species. To achieve the aims, a recovery data set was also used.

The second study focused on the application of stable isotope ratios of carbon, nitrogen and sulfur to infer the trophic attitudes of different passerine species during the breeding season. In this study more species were analyzed, aiming to understand if isotopic variability of carbon, nitrogen and sulfur were able to distinguish trophic relationships between species which have similar diets. It was found that species are isotopically different grouping them for migratory phenology.

These first two studies want to be a start point to better understand migrant trends across the Alps and Europe, and to improve knowledge in using stable isotopes in European continent.

The third case study focused on lesser kestrel breeding ecology in the Gela Plain, in Sicily. In particular the stable isotope ratios of hydrogen, carbon, nitrogen, oxygen and sulfur were measured in feathers of nestlings. The aim of this study was to delineate the isotopic fingerprint of the hunting areas of their parents, making possible to distinguish different spatial uses of adults within and between colonies, and verifying if different habitat selected may be translated into distinct isotopic composition in keratinous tissues. Findings underlined the potential that a multi-isotope approach has in studying animal ecology, especially in detecting trophic partitioning and habitat selection at local and regional scale.

### Thesis 3

#### **Movements and home range of the Eurasian Griffon Vulture (*Gyps fulvus*) in the eastern Alps and Adriatic region, in relation to food availability**

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Academic Year: 2016/2017

#### **Abstract**

The Griffon Vulture (*Gyps fulvus*) is a colonial cliff-nesting raptor, being mainly distributed in the countries around the Mediterranean Sea. The Italian populations amount to 170 breeding pairs. In the Eastern Alps, Griffon Vultures are usually present in spring and summer, spending the warmer months of the year in a huge area covering the region Friuli Venezia Giulia and part of the Slovenian and Austrian Alps. A conservation project focused on the species began in the "Riserva naturale regionale del Lago di Cornino" (Udine-Italy 46°13'N, 13° 01'E) at the end of the 1980s. The local population actually reach a minimum of 120-150 individuals in winter and more than 250 in summer, when many birds arrive from Croatia and other countries.

The birds are strictly dependent upon one feeding point that provides a large amount of food throughout the year and especially during the winter months. In the other areas they depend on carcasses of grazing animals.

The research aims to define the areas used by vultures in different months and seasons, in different countries and the ways in which they move and stay as a function of their feeding search strategies.

12 griffon vultures were captured and equipped with GPS satellite tracking unit equipment, from 2005 to 2014. The home range movements and lengths of stay were estimated based on 127 to 4,586 fixes, depending on the individual. The home ranges on a monthly basis and with respect to the different areas, Austria, Italy and Croatia, differed from each other. With regard to the extent of the Minimum Convex Polygon (MCP), Croatia is, on average, equal to 1,142 km<sup>2</sup>, Italy 336 km<sup>2</sup> and Austria, 389 km<sup>2</sup>. These values appear influenced by the closeness to the sea in Croatia. The home range size (HR95: kernel density estimation at 95%; HR50 kernel density estimation at 50%) minus the sea areas appear to differ between Croatia (HR95=188 km<sup>2</sup> e HR50 28 km<sup>2</sup>) and Italy (HR95 215 km<sup>2</sup> e HR50 42 km<sup>2</sup>) compared to Austria (HR95 49 km<sup>2</sup> e HR50 19 km<sup>2</sup>), where it is lower. The Austrian Alps are visited only in summer (from June to early October), while the birds' presence is distributed throughout the year in the Croatian and the Italo-Slovenian areas. The total residence time on a monthly basis is

greatest in Italy (days=18.71+10.68) compared to Croatia (14.03+10.15) and Austria (15.08+11.65), while the average length of stay (average number of days of residence per visit) (17.25+11.25 Italy, Croatia 13.13+9.94, Austria 16.62+11.33) and the frequency of monthly visits are not statistically different for the three areas. All the variables studied vary according to the season, with a greater number of days of presence in autumn and winter, seasons in which there are fewer movements and smaller home ranges, particularly in winter.

The presence of a feeding point does not appear to significantly reduce the areas explored by griffon vultures, even if the residence times and the frequency of utilization appear higher. Overall, the presence of a feeding site appears to be an effective tool to foster the conservation of the species.

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