



UNIVERSITÀ DEGLI STUDI
DI TRENTO
Dipartimento di Ingegneria Civile,
Ambientale e Meccanica



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XVII Convegno Italiano di

ORNITOLOGIA

Trento, 11-15 settembre 2013

Programma e Abstract

Curatori:

Daniela Campobello

Paolo Pedrini

Marco Ciolli

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Con la collaborazione di: Aaron lemma, Francesca Rossi

su più anni dovrebbero consentire, avvalendosi anche dei dati noti in letteratura, di produrre carte tematiche della migrazione postriproduttiva a livello regionale fornendo ulteriori elementi utili ad una più oculata gestione dell'avifauna migratrice.

The use of stable isotopes (C, N, O, H) in the study of the postbreeding migration across the Alps

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In animals, the stable isotope ratios of bioelements such as carbon, nitrogen and hydrogen reflect those in the diet and in drinking water, which in turn mostly depend on climatic, hydrological or geographical conditions, all this being due to isotopic fractionation occurring during physical and chemical processes and along metabolic pathways. For this reason, over the last 25 years analysis of stable isotope ratios has gradually become a formidable tool for animal ecologists. In particular, many studies have been carried out to track the movement and diet of birds over time and space, aspects fundamental for understanding their ecology, but also inherently difficult to determine. The aim of this study was to extend knowledge of the origin and behaviour of migratory bird species crossing the Trentino area, an Italian alpine region, during the post-nuptial migration period. Species were monitored using ringing activities in a long term study within the Alpi project. About 800 samples of feathers from 48 species were collected during the period 2010 – 2011 at Bocca di Caset ringing station (1605 m.s.m.). Analysis of $\delta^{13}\text{C}$, $\delta^{15}\text{N}$ and $\delta^2\text{H}$ was performed on these samples using an Isotope Ratio Mass Spectrometer (IRMS) interfaced with an Elemental Analyser or pyrolyser, after pre-treatment of the feathers (cleaning with diethyl ether : methanol 2:1, equilibration to ambient humidity for 4 days). An initial survey of the data obtained is here presented. As expected, preliminary results confirmed that ^{13}C can be used to trace the importance of different carbon pools in the foods consumed (e.g. C3, C4 or CAM plants, marine algae), whereas $\delta^{15}\text{N}$ varied on the basis of a variety of biological, geochemical and anthropogenic processes and is very effective in tracing trophic level. In particular, species whose diet is based primarily on invertebrates (e.g. *Motacilla flava*) had the highest $\delta^{15}\text{N}$ values, whereas totally granivorous species (*Carduelis spinus*, *Coccothraustes coccothraustes*) showed the lowest values. Interestingly *Loxia curvirostra* showed particularly high $\delta^{13}\text{C}$ and low $\delta^{15}\text{N}$ values, probably due to the consumption of conifer seeds. On the other hand, $\delta^2\text{H}$ values were strongly affected by the geographical characteristics of the regions in which the birds grew up. Species of central-European origin such as *Troglodytes troglodytes* showed higher $\delta^2\text{H}$ values, whereas species that originate mainly from north-eastern Europe (e.g. *Carduelis spinus*, *Fringilla montifringilla*) showed lower values. However, the range of values in some species (e.g. *Delichon urbicum*, *Carduelis spinus*, *Fringilla montifringilla*, *Erithacus rubecula*) was rather wide, probably due to a higher heterogeneity in their areas of origin. The results are in agreement with the gained knowledge as regards both diet and possible origin of migratory birds in transit in the Alps and suggest that further elaborations with a multi-isotope approach might increase knowledge as regards migratory origin.