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MORPHOMETRIC CHARACTERSTICS AND BODY CONDITION OF A COMMON SPADEFOOT TOAD *PELOBATES FUSCUS INSUBRICUS* POPULATION IN LOMBARDY

SUMMARY

During the monitoring activities of *Pelobates fuscus insubricus* in the areas of the Natura 2000 network (SAC IT 2010011 Paludi di Arsago) and the Regional Park of the Ticino Valley (Lombardy) as part of the two Life projects INSUBRICUS and GESTIRE 2020, amphibians were captured in pitfall traps to collect data on the health status and seasonal migration. Ninety-six individuals were measured (SVL and weight) and photographed. Using the Image J software (vers. 1.5) other 14 morphometric measurements were obtained. The body condition index (CI) for each sex before and after reproductive activity was calculated using the Scaled Mass Index (SMI). Sexual size dimorphism was verified for some morphometric characteristics The CI appears to be strongly influenced by sex and the reproductive status. In our population *P. fuscus* behaves like an explosive breeder and the animals remain in water for a short period. Egg investment appears to be a relevant factor for the body condition of females, while reproduction activity does not appear to significantly impact on males. The CI is considered an effective indicator of fitness and habitat quality. Our results improve the knowledge on morphometric characteristics and body condition of the spadefoot toads in Lombardy. Moreover these results, also linked to habitat data, can provide useful indications for more targeted actions within conservation projects.

Keywords: Morphometrics, Body Condition Index, Common spadefoot toad, Northern Italy.

RIASSUNTO

Morfometria e condizione corporea di una popolazione di Pelobate fosco italiano Pelobates fuscus insubricus *in Lombardia.* Nell'ambito dei due progetti Life, INSUBRICUS e GESTIRE 2020, sono state svolte attività di monitoraggio su *Pelobates fuscus insubricus* all'interno della ZSC IT 2010011 "Paludi di Arsago" e in un'altra area limitrofa nel Parco regionale lombardo della Valle del Ticino. Gli anfibi sono stati catturati in trappole a caduta per raccogliere dati sullo stato sanitario e sulle migrazioni stagionali. Novantasei pelobati sono stati misurati (SVL e peso) e fotografati. Tramite il

software Image J (vers. 1.5) si sono ottenute altre 14 variabili morfometriche. La condizione corporea (CI) per i due sessi pre e post riproduzione è stata calcolata tramite Scaled Mass Index (SMI). Per alcuni caratteri morfometrici è emerso dimorfismo sessuale; SMI appare fortemente influenzato da sesso e stato riproduttivo. Nella popolazione studiata *P. fuscus* si comporta come riproduttore esplosivo e gli animali generalmente soggiornano nel sito acquatico per un breve periodo. Per le femmine l'investimento sulle uova è risultato un fattore rilevante per la condizione corporea, mentre per i maschi l'attività riproduttiva sembrerebbe non avere un impatto significativo. Il CI è considerato un buon indicatore oltre che di fitness anche della qualità dell'habitat. I risultati ottenuti, in relazione alle caratteristiche degli habitat, forniscono indicazioni utili per azioni più mirate nell'ambito dei progetti di conservazione.

Parole chiave. Morfometria, Indice di condizione corporea, Pelobate fosco, Nord Italia.

Introduction

The present study was performed during a long-term monitoring of the Spadefoot toad populations and a screening for *Batrachochytrium dendrobatidis* as part of the INSUBRICUS (LIFE19-NAT/IT/000883 INSUBRICUS) and GESTIRE 2020 (LIFE14 IPE IT 018GESTIRE2020) activities, respectively.

Both European life projects aim to improve the conservation of the habitats of Lombardy and of the protected species listed in the annexes of the Habitat Directive 92/43/EEC. *Pelobates fuscus insubricus* is included in Annex II as a priority species and is classified as endangered (EN) by the Italian IUCN Red List (Rondinini *et al.*, 2013) with declining population in most of its national range (C2a(i)).

Population health assessment of the populations is the first step in planning effective conservation actions for amphibian populations. It has been widely stated that body condition based on the relationship between body mass and length measurements is an important determinant of fitness.

Material and Methods

We sampled ninety-six common spadefoot toads in wetlands inside the Natura 2000 network (SAC IT 2010011 Paludi di Arsago) and adjoining area in the Regional Park of the Ticino Valley (Lombardy). We performed captures and handling of individuals according to the permissions granted by the former Italian Ministry of Environment, Land and Sea Protection (MATTM) - currently titled as Ministry of Ecological Transition (MiTE). Amphibians were caught in pitfalls arranged inside and outside the barriers delimiting the reproductive areas to collect data on the health status and

seasonal migrations (movement to and from the pond). The toads were measured and immediately released at the site of capture. Body mass (W) was measured to the nearest 0.01 g with a portable electronic balance (TANITA mod. 1479). Snout-vent length (SVL) was measured to the nearest 0.01 mm using a dial-calliper. Age class was assigned to each individual (adult if SVL > 40 mm), gender was identified according to sex-specific external characters (i.e., presence/absence of the nuptial gland on the upper arm in males) and both dorsal and ventral sides were photographed by placing the animal on graph paper. Another 14 morphometric measurements (according to Watters *et al*., 2016) were obtained by analysing the image using the Image J software (vers. 1.5), setting a known distance for each picture based on the graph paper.

We calculated the Condition Index (CI) separately for each sex before and after reproduction activity, using the Scaled Mass Index (SMI) that standardizes body mass at a fixed value of a linear body measurement based on the scaling relationship between mass and length (Peig & Green, 2010).

Results and Discussion

Sexual size dimorphism between males and females was verified for some morphometric characteristics such as the body length, with females being significantly larger than males (SVL_F: mean ± s.e.: 60.09 ± 0.55 mm, min-max: 42.9 – 65.0 mm *vs* SVL_M: mean ± s.e.: 50.7 ± 0.49 mm min-max: 42.7-59.4 mm; Mann-Whitney U-test: $P<0.001$).

The Condition Index (CI) appears strongly influenced by sex and reproductive status. SMI values differ significantly between males and females (Mann-Whitney U-test: $P<0.001$) and between females migrating to and from the breeding site (Mann-Whitney U-test: $P<0.001$), while no difference was found between the two groups of males (Mann-Whitney U-test: $P>0.05$).

Although little is known about the Italian common spadefoot toad populations, our results improve the knowledge on the external morphometric characteristics and body condition of the species. In general, we can consider the CI an indicator of fitness and habitat quality. Taking into account that in our population *P. fuscus* behaves like an explosive breeder with individuals remaining in water for a short period, the egg investment appears to be a relevant factor for the body condition of females, while reproduction activity does not appear to significantly impact on males. These results, also linked to habitat data, can provide useful indications for more targeted actions in the context of conservation projects.

REFERENCES

PEIG J. & GREEN A.J., 2010. The paradigm of body condition: a critical reappraisal of current methods based on mass and length. *Funct. Ecol.*, 24: 1323-1332.

RONDININI, C., BATTISTONI, A., PERONACE, V. & TEOFILI, C., 2013. Lista Rossa IUCN dei Vertebrati Italiani. *Comitato Italiano IUCN, Min. Amb. Tutela Terr. Mare*, Roma.

WATTERS J.L., CUMMINGS S.T., FLANAGAN R.L., CAMERON D. & SILER C.D., 2016. Review of morphometric measurements used in anuran species descriptions and recommendations for a standardized approach. *Zootaxa*, 4072 (4): 477-495.

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