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New reproductive locations for the common spadefoot toad *Pelobates fuscus* (Anura: Pelobatidae) in Como province, Italy

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Abstract - The common spadefoot toad *Pelobates fuscus* is a highly protected amphibian species, vulnerable to habitat fragmentation and numerous other environmental changes. This note reports the discovery of new reproductive sites for the species in Como province, representing the northernmost locations known in Italy to date. These findings underscore the ecological importance of small, neglected wetlands in sustaining amphibian populations. Field surveys conducted from July 2024 to March 2025 assured the reproduction of *P. fuscus* alongside other protected amphibian species. These discoveries also suggest probable undocumented populations in the nearby areas comprising the Swiss region, where *P. fuscus* was last recorded in 1946. Given the species' cryptic nature and fragmented distribution, further research integrating traditional surveys and molecular techniques is essential to reassess its actual range and develop effective conservation strategies.
Key words: distribution update, aquatic habitats, conservation, population, monitoring.

Riassunto - Nuovi siti riproduttivi del pelobate fosco *Pelobates fuscus* (Anura: Pelobatidae) in provincia di Como, Italia

Il Pelobate fosco *Pelobates fuscus* è un anfibio rigorosamente protetto, vulnerabile alla frammentazione degli habitat e ad altre modificazioni ambientali. Si segnala la scoperta di nuovi siti riproduttivi nella provincia di Como che risultano i più settentrionali in Italia. Questa scoperta evidenzia l'importanza ecologica che anche le aree umide minori e sotto-monitorate hanno nel sostenere le popolazioni di anfibi. Da luglio 2024 a marzo 2025 sono stati condotti vari sopralluoghi che hanno accertato la riproduzione di *P. fuscus* assieme ad altre specie di anfibi protette. Inoltre, si ritiene probabile la presenza di altre popolazioni nel comparto geografico, compreso il territorio svizzero, prossimo, dove la specie risulta assente dal 1946. Considerata la natura criptica della specie e la sua distribuzione frammentaria, è essenziale proseguire gli sforzi di ricerca combinando tecniche tradizionali e molecolari, al fine di revisionare la sua distribuzione e sviluppare di conseguenza misure di conservazione efficaci.
Parole chiave: aggiornamento distributivo, habitat acquatici, conservazione, popolazione, monitoraggio.

The population is the fundamental unit at which conservation science works. Therefore, investigating actual distribution of endangered species is of prior importance for addressing conservation goals. To achieve this, traditional field research remains valuable, complemented by novel techniques such as eDNA Metabarcoding (Svenningsen *et al*., 2022). Traditional field research can still play a role also in form of opportunistic discoveries.

The Italian distribution of the common spadefoot toad *Pelobates fuscus* (Laurenti 1768) centres in the Po Plain. The species has long been considered a polyphyletic with two traditionally recognized subspecies in Central Europe (*P. f. fuscus*) and in Northern Italy (*P. f. insubricus*), albeit in the absence of clear discriminating phenotypic characters. Recent genetic research has however shown that this amphibian is actually monophyletic (Crottini *et al*., 2007; Litvinchuk *et al*., 2013). The conservation status of the species at the global level is not considered worrying although the species is particularly susceptible to environmental changes such as human-induced habitat fragmentation (Krása *et al*., 2024). However, widespread declines involve particularly the western range of the global distribution, comprising Italy (Eggert *et al*. 2006; Lanza *et al*., 2007). In particular, Italy's situation led to a higher national conservation status assessment of the species (Endangered: Rondinini *et al*., 2022). Its compromised conservation status has been rising the attention on Italian populations of this amphibian, object of high legal protection and of several conservation projects since decades, of which the ongoing Life Insubricus "LIFE19-NAT/IT/000883 INSUBRICUS" is the last one (Andreone, 2001; Crottini & Andreone, 2007).

Here, we report the discovery of two new reproductive locations in Como Province, Italy, after 10 years since the last such finding in the country. This discovery corroborates the notion of a highly suitable area for *P. fuscus* and other amphibians in the northwestern sector of the Lombardy plain, between Varese and Como provinces. The same region, historically known as "Seprio", hosts three additional populations of *P. fuscus*, including the one identified as the most abundant in Italy (Bergò *et al*., 2014; Seglie *et al*. 2017). A geographic overview is provided in Fig. 1.

The first out of two new populations was discovered on 23 July 2024, in the "Boschi di San Quirico" woodland (Solbiate con Cagno, Como). Several *P. fuscus* larvae were found at high density in a small, forested swamp at an advanced development stage (Fig. 2). Follow-up surveys estimated up to 50 tadpoles. Swab samples were collected for genetic characterization as part of Life Insubricus activities. Surveys assured that the swamp also serves as a reproduction site for Italian tree frog *Hyla intermedia* L. 1758, pool frog *Pelophylax* sp., agile frog *Rana dalmatina* Fitzinger in Bonaparte 1838, Italian agile frog *Rana latastei* Boulenger 1879, fire salamander *Salamandra salamandra* L. 1758 and Italian crested newt *Triturus carnifex* Laurenti 1768.

This wetland lies along the southern margin of a railway track connecting Como and Varese until 1966 (Cornolò, 1979). The remaining track ballast dams up the water runoff, shaping an elongated swamp. During the surveys, the water covered an area of about 30×10 m, reaching a depth of more than 60 cm in mid-October, drying out in August and flooding again in September. Past satellite images indicate an extension up to 70×15 m. A thick organic litter layer on the ground reflects the advanced closure stage of the wetland. Indeed, it remains shallow, responding to the increased water input during the wetter periods with an expansion of surface rather than depth. Overall, it is curious how a former fragmentation element is now having the valuable side-effect of supporting habitat formation.

The second reproduction site was discovered on 26 March 2025 through the detection of at least 10 distinct calling males. The listening session lasted approximately one hour, using a Telinga PRO X Parabolic Microphone connected to a Tascam DR-05X recorder. Numerous individuals of Italian tree

frog were also heard calling and numerous egg clutches of agile frog and some individuals of smooth newt *Lissotriton vulgaris meridionalis* Boulenger 1882 were observed.
This wetland consists of a relatively large marshland (over 6,000 m^2) and is surrounded by cultivated fields, meadows, and wooded areas. To the south, there is a flooded common alder *Alnus glutinosa* (L.) Gaertn. woodland of approximately 3,000 m^2. The site is located about 1,5 km in a straight line from the one discovered in 2024, in the same municipality. The wetland features an active drainage ditch, which significantly limits its flooded surface. At the time of the inspection, the maximum depth is about 70 cm, with an average depth of approximately 40 cm. The open water areas are extremely reduced, with most of the surface occupied by sedges, interspersed with zones of rushes and cattails. The relative extent of the wetland and the semi-natural context in which it is situated suggest the persistence of a reproductive population.
An isolated record of an individual near Cascina Pinazzo, Valmorea (Como) in June 2005 (Seglie *et al*., 2017), 2 km apart from the new reproductive sites and never linked to a source wetland, can now be interpreted as a dispersing adult from the new reproductive sites. Alternatively, additional sites might exist involving the numerous neglected wetlands by the surrounding woodlands. Proximity to the Swiss border (less than 4 km) raises the chance to undiscover populations in Canton Ticino area, where *P. fuscus* was last reported in 1946 with no further evidence since (Ghidini, 1904; Schweizer, 1946). This would signify a reconsideration of the *P. fuscus* status in Switzerland where the species is now classified as extinct.
The locations here reported are the northernmost (45°47'58.15"N) known Italian reproduction sites for *P. fuscus*. "Laghetto del *Rusùn*" in Appiano Gentile, CO (Seglie *et al*., 2017) is the closest reproductive site (6 km southwards). Connectivity for *P. fuscus* between the areas is questionable due to urban settlements and high traffic roads fragmenting ideal corridors. Intermediate reproductive locations are also unlikely as ponds are impacted by invasive alien species (i.e. Stagno Cà Bianca, Stagno di San Siro) or long-term monitored without yielding results. Also, relatively short lifespan makes long distance dispersion unlikely, especially in absence of widespread, suitable wetlands to serve as stepping stones (Eggert, 2002; Andreone *et al*., 2004). An aid in this sense will be the creation of wetlands undertaken by Life Insubricus project in the area in between the populations. On the other hand, road construction planned nearby could erase *P. fuscus* reproductive sites that have yet to be noticed.
These fortunate discoveries highlight the pivotal role of timing in detecting cryptic species as *P. fuscus*, whose actual distribution is very likely still underestimated (Crottini & Andreone, 2007). Further surveys, ideally combining multiple methods, are necessary to assess the true contribution of Insubrian region to the enigmatic *P. fuscus* population in Italy. Calling for sound conservation efforts, it is encouraged the already planned extension of a local protection area (Parco Valle del Lanza) which would embrace the newly discovered *P. fuscus* populations.

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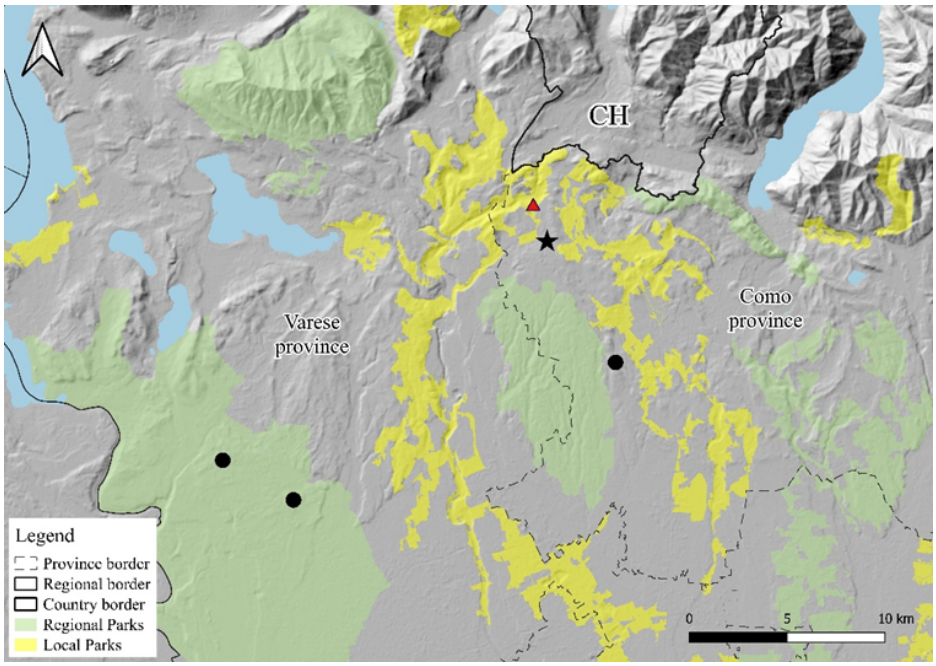

Fig. 1 – Black dots indicate previously known populations, while the black star marks the newly discovered ones; the red triangle represents the 2005 record of a single individual. / I cerchi neri indicano le popolazioni note in precedenza, mentre la stella nera indica le nuove popolazioni scoperte; il triangolo rosso rappresenta il ritrovamento di un singolo individuo nel 2005.

Fig. 2 – *P. fuscus* tadpoles about to emerge from the swamp on 31 July 2024, temporarily kept in a basin. / Girini di *P. fuscus* in procinto di emergere dall'area umida il 31 luglio 2024, temporaneamente riposti in una vaschetta.