

**A survey on the presence of the invasive alien American bullfrog, *Lithobates catesbeianus* (Shaw, 1802) (Amphibia Anura Ranidae) in Latium (Central Italy) with reference to a possible infection of *Batrachochytrium dendrobatidis* on *Bufo bufo***

**Istraživanje prisustva invazivne Američke zelene žabe, *Lithobates catesbeianus* (Shaw, 1802) (Amphibia Anura Ranidae) u Latiumu (Centralna Italija) sa osvrtom na potencijalnu zarazu jedinke *Bufo bufo* sa gljivicom *Batrachochytrium dendrobatidis***

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**Abstract**

The aim of this paper is to analyze the presence of the American bullfrog in Latium and its expansion in recent years. In this regard are given two unpublished reports. We want to pay specific attention on the discovery of a specimen of *Bufo bufo* probably affected by *Batrachochytrium dendrobatidis*.

**Key words:** American bullfrog, Invasive alien species, *Lithobates catesbeianus*, Latium, Italy

**Sažetak**

Cilj ovog istraživanja jest analiza prisustva Američke zelene žabe na području Latiuma, te njezino širenje tijekom posljednjih par godina. U skladu s tim ovdje prezentiramo dva nova nalaza ove vrste. Želja nam je posvetiti posebnu pozornost na zabilješku jedinke *Bufo bufo* vrlo vjerojatno zaraženu *Batrachochytrium dendrobatidis*.

**Ključne riječi:** Invazivne strane vrste, *Lithobates catesbeianus*, Latium, Italija

*Lithobates catesbeianus* Shaw, 1802 is an amphibian of family *Ranidae*, native to North America. It is a big frog since it is able to exceed 30 cm in length and 1600 g of weight (Lanza 1983). The females are larger than the males. A very large and obvious tympanic membrane is present in the temporal area. Bullfrog changes in color, above from dark olive to pale green, beneath from white to cream. This anuran is not only an efficacious competitor to native species but it is, also, an omnivore that feeds on all animals smaller than itself, including fishes, reptiles, amphibians and water birds (Lambertz & Schmied 2010, Snow &

Witmer 2010). Furthermore, the American bullfrog is known to act as a vector for *Batrachochytrium dendrobatidis* dispersion (Hanselmann et al. 2004, Garner et al. 2006, Federici et al. 2008, Dejean et al. 2010, Ficetola & Scali 2010). This fungus is largely implicated in global amphibian's declines (Berger et al. 1998, Blaustein & Kiesecker 2002, Mazzoni et al. 2003, Kats & Ferrer 2003).

The American bullfrog is listed on the list of "100 of the world's worst invasive alien species". These species were selected using two criteria: their serious impact on biological diversity and/or human

activities, and their illustration of important issues of biological invasion (Lowe et al. 2000). In Italy this species is under CITES regulation (All. B, Directive EU 101/2012) (G.U.U.E. 2012), because its introduction represents a threat to indigenous species (Di Cerbo & Biancardi 2013).

In Europe its presence is confirmed, as well as for Italy, also for Belgium (Wallonia, Flanders), France (Bordeaux), Germany (Bonn, Baden-Wurttemberg), United Kingdom (Surrey), Greece (Crete), Netherlands, (Breda) and Spain (Canary Islands, Cáceres, Cataluña). It's possible that the population of United Kingdom has currently been eradicated. It was probably introduced to Switzerland, although this requires further confirmation (Santos-Barrera et al. 2009). In Italy the introduction of *Lithobates catesbeianus*, through specimens from Louisiana (U.S.A.), is dated to the thirties of last century and seems to be related to food purposes (Albertini & Lanza 1988, Capula et al. 2005). The first successfully acclimatization occurred between 1932 and 1937 in the Corte Brusca district (Bigarello, Mantova) through frogs released by Mr. G. Cavallero (Albertini 1970), and it would spread in short time in other territories by some farmers who would use it for edible purposes (Albertini & Lanza 1988). In few years the Bullfrog expanded itself to the point that, at the end of the eighties the species was known in more than 160 sites (Scali 2010). Currently the presence of Bullfrog in Italy is less considerable, but there are reports for Lombardy (Bergamo, Brescia, Cremona and Pavia), Veneto (Verona and Rovigo), Piedmont (Asti and Torino), Emilia-Romagna (Bologna, Modena, Ferrara, Piacenza and Reggio Emilia), Tuscany (Firenze, Pisa and Pistoia) and Latium (Latina and in province of Rome: Maccarese, Torre in Pietra, Pomezia, Tor San Lorenzo, Monterotondo Scalo, Fiano Romano and Civitella San Paolo, Trigoria). Specimens were introduced in the provinces of Vercelli, Novara and Udine but without acclimatization (Lanza et al. 2007).

For drafting of this paper has been consulted the bibliography regarding the American bullfrog in Europe and in Italy. The authors have conducted field works and they availed themselves of unpublished data of some colleagues.

The oldest report of *Lithobates catesbeianus* in Latium refers to 1969 at Pomezia in the province of Rome (Bruno 1969).

In the Atlas of Amphibians and Reptiles of Latium of 2000, the American bullfrog is reported only in three localities: Maccarese - Torre in Pietra (Zona 40), Pomezia (Rio Torto) and Tor San Lorenzo (Colle Romito). The specimens imported in Maccarese in 1974, came from Castel d'Ario (MN), the origin place of the owner of the three sport fishing lakes in this locality. In the same Atlas is mentioned that already in 1996 the Maccarese populations was missing, possibly due to the restructuring of the lakes where the American bullfrog was present (Bagnoli 2000). In the following Atlas of Amphibians and Reptiles of Province of Rome of 2007, the earlier reports were confirmed, bringing however into question their current presence (Bologna et al. 2000), although some reports confirm its presence in Maccarese. These reports are related to vocalizations heard in July 2005 in the area of "Vasche di Maccarese" and to sightings of specimens in adjacent canals to Via delle Pagliete, Via dei Collettori, Via dei Tre Denari and in the small pond of plant nursery of the Maccarese Spa (Bologna, Rome, pers. comm. 2014). A recent paper has confirmed the presence of *L. catesbeianus* in the canals of Viale Maria at Maccarese (Pizzuti Piccoli & Cattaneo 2008). Through the years the transformation of the crops and irrigation techniques has been modified and it has had a decisive influence on the decline of populations of the whole Maccarese area. In November 2014, a spill of kerosene used as a fuel in the near International Airport of Fiumicino, created a huge environmental catastrophe in the whole area between Maccarese and Palidoro. Over 30 tons of kerosene has contaminated Rio Tre

Cannelle and tens of surrounding hectares, killing thousands of fishes, frogs, turtles, shrimps and water birds. This serious episode allowed to verify that among the thousands of dead animals was not present any American bullfrog (Di Giuseppe, Maccarese, pers. comm. 2014; Polinori, Ostia, pers. comm. 2014). Therefore, we can state that in the area of Maccarese, *Lithobates catesbeianus* can be considered absent.

In 2014 a very large population of American bullfrog (Fig.1) has been reported in a group of four small lakes in locality Semblera, Monterotondo Scalo, along Via Salaria about twenty kilometers from Rome. This area is adjacent to the left bank of Tevere River. Originally these small lakes were clay quarries used by a brick factory. At the end of the eighties these quarries were abandoned, filled with waste materials and subsequently with water. Initially, one of these ponds was used for sport fishing. Later they were no longer used and this allowed the rooting of luxuriant vegetation (Grano & Cattaneo 2014). In the same paper, the authors indicate another report of American bullfrog in province of Rome. This report refers to some quarries currently filled with water, located between Fiano Romano and Civitella San Paolo. Furthermore these quarries are placed nearby the Tevere River and are about twenty kilometers from the other quarries of Monterotondo Scalo (Grano & Cattaneo 2014).

For the first time we report the presence of *Lithobates catesbeianus* in the area of Trigoria, a fraction of Rome of the twelfth kilometer of Via Laurentina. The specimens were found in an ornamental pond of a residential center. The big tadpole (Fig. 2) were photographed and sent to "Centro Recupero di Fauna Selvatica, Lipu" at Rome for the determination (Manzia, Rome, pers. comm. 2014).

The most recent report, never reported before, regards the only locality of Latium that it's not in the province of Rome. It's a group of lakes utilized for sport fishing and for the rearing of ornamental fish, located on the

Strada Statale 156 of Monti Lepini at Latina. In these lakes there are many tadpoles and adults of American bullfrog (Carlino, Rome, pers. comm. 2015).

Unfortunately a specimen of common toad *Bufo bufo* with severe skin lesions (Fig. 3), perhaps referable to *Batrachochytrium dendrobatidis*, has been retrieved from "Centro Recupero Fauna Selvatica, Lipu" of Rome (Manzia, Rome, pers. comm. 2014). Fragments tissue were promptly collected and sent to a specialized laboratory in order to confirm the diagnosis; we are currently waiting for a response. If the result of these analyzes will be positive, it would be a serious problem for indigenous amphibians populations.



Figure 1. Specimens of American Bullfrog found in a lake of Monterotondo Scalo (Rome).

Slika 1. Jedinka Američke zelene žabe pronađene u jezeru Monterotondo Scalo (Rim).



Figure 2. Big tadpole of American Bullfrog photographed in a pond of Trigoria (Rome).

Slika 2. Punoglavac Američke zelene žabe fotografiran u jezeru u Trigoriji (Rim).



Figure 3. *Bufo bufo* affected by several skin lesions.

Slika 3. *Bufo bufo* sa izraženim lezijama na koži

In Latium, the American bullfrog is regularly present from over forty years and during the last year has been reported four new localities. Recent studies (Ficetola et al. 2008) have shown that the Italian populations of *L. catesbeianus* have originated from a considerably small strain (less than six females), thus highlighting the great expansion capacity and rooting of this invasive frog (Scali 2010).

Therefore, it is necessary to carry out regular monitoring activities in order to record in time and to avoid eventual invasive processes, especially in the colonization of other new sites also due the strong impact which may exert on ecology and community structure of endemic amphibians (Andreone & Marocco 1999, Bologna et al. 2000). Furthermore the introduction of fish for sport fishing should be monitored with particular attention. It's common practice, at least in Italy, populate the sport fishing lakes with a mixture of juvenile fishes coming from areas close to Mantova, where *L. catesbeianus* is certainly present with large populations, therefore, together with the juvenile fishes may have been many tadpoles of American bullfrog (Andreone 2005, Ferri 2006).

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