UNEP-WCMC technical report

REVIEW OF EU TRADE IN *PELOPHYLAX* SPECIES FROM ALBANIA AND TÜRKIYE

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Review of EU trade in *Pelophylax* species from Albania and Türkiye

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Introduction and summary

This report provides a summary of information on the conservation status and trade of the five species of *Pelophylax* (a genus of water frogs, formerly *Rana*) present in Albania and Türkiye. Concerns regarding the sustainability of trade in this genus, which contains species subject to high levels of trade for the EU market in frogs' legs, have been raised in multiple recent studies and reports (e.g., Auliya *et al.*, 2023; Çiçek *et al.*, 2021; ProWildlife & Robin de Bois, 2022). None of the species in the genus are currently listed in the CITES Appendices and *P. shqipericus* is the only species of *Pelophylax* included in the EU Wildlife Trade Regulations.

Taxonomic note: The genus *Pelophylax* (previously *Rana*) has been described as a poorly defined species complex comprising genetic, phylogenetic, and ecological forms (Çiçek *et al.*, 2021). High morphological polymorphism and interspecific hybridisation in the genus (Breka *et al.*, 2020; Jelić *et al.*, 2022) is reported to hinder species identification (Çiçek *et al.*, 2021), with evidence of cryptic species of similar morphology found in the Anatolia region (Akın *et al.*, 2010).

This report follows the taxonomy of Frost (2023), which recognises three species as native to Albania *(P. epeiroticus, P. kurtmuelleri,* and *P. shqipericus*) and two species as native to Türkiye (*P. bedrigae* and *P. ridibundus).* However, it should be noted that, in Türkiye at least, some exporting companies were reported to label all frogs as *P. esculentus* (a hybrid comprising *P. ridibundus and P. lessonae* often referred to as "edible frog", that is absent from the country (Çiçek *et al.*, 2021)), and mislabelling has been reported to be widespread in other species imported to the EU for the frogs' legs market (Auliya *et al.*, 2023).

Pelophylax epeiroticus, *P. kurtmuelleri* and *P. ridibundus/* Albania

SPECIES IUCN RED LIST (pop. trend) (year)	SYNONYMS	COMMON NAME	RANGE STATES (Frost, 2023)
P. epeiroticus NT (↓) (2019)	*Pelophylax epeirotica* Schneider, Sofianidou & Kyriakopoulou-Sklavounou, 1984; *Rana epeirotica* Schneider, Sofianidou & Kyriakopoulou-Sklavounou, 1984	Epirus Water Frog	Albania, Greece
P. kurtmuelleri LC (↓) (2019)	*Rana balcanica* Schneider, Sinsch & Sofianidou, 1992; *Rana kurtmuelleri* Gayda, 1940	Balkan Water Frog	Albania, Bulgaria, Greece, Italy (Int.) Montenegro, North Macedonia (Distribution uncertain), Serbia (Distribution uncertain), Slovenia (Int.) Switzerland (Int.)
P. shqipericus VU (↓) (2019)	*Rana shqiperica* Hotz, Uzzell, Guenther, Tunner & Heppich, 1987	Albanian Water Frog	Albania, Italy (Int.), Montenegro

SUMMARY

All three species are considered to have a globally decreasing population trend. *P. epeiroticus* and *P. shqipericus* have relatively restricted distributions in the west and south of Albania respectively, while *P. kurtmuelleri* has a larger distribution covering much of the south of the country. Overexploitation is considered to be a current threat to *P. kurtmuelleri* and *P. shqipericus* in the northern parts of their global ranges, with Lake Skadar, located on the border between Albania and Montenegro, highlighted as an example of a harvest site subject to over-collection. While *P. epeiroticus* was also reported to have been harvested in large numbers, the latest IUCN assessment for the species found no evidence to suggest excessive collection in Albania. No estimates of population decline rates from areas that were reported to be subject to overharvest could be located.

P. shqipericus is the only species of *Pelophylax* included in the EU Wildlife Trade Regulations (it was added to Annex D in 2009). However, no EU Member States reported trade in the species 2012-2021. Other EU trade data are available from the EUROSTAT database, based on the HS code for "fresh, chilled or frozen frogs legs". EUROSTAT data indicate that 492 tonnes of frogs' legs were imported into the EU from Albania 2012-2022, all by Italy; using an estimate that one kilogram of frogs' legs contains between 20 and 50 individuals (Veith *et al.*, 2000), this would amount to 9.84 million- 24.6 million individuals being imported to the EU from Albania across an 11-year period. However, it should be noted that data from EUROSTAT are not species-specific, and that no information could be located to confirm whether Albania exports genera other than *Pelophylax* for the frogs' legs trade. EUROSTAT also does not include information on whether the exporting country is also the country of origin for the product. Given that no evidence of captive breeding facilities in Albania was located, the majority of trade is assumed to be in wild-sourced specimens.

Albania has reportedly had a national ban on hunting and collection of all wildlife since 2014; the legal basis for harvest and export is therefore unclear.

Conservation status

Global

Biology: Tables 1 and 2 provide information on the habitat requirements and body sizes of *P. epeiroticus, P. kurtmuelleri,* and *P. shqipericus.*

Table 1. Habitat requirements of *P. epeiroticus, P. kurtmuelleri,* and *P. shqipericus*.

Species	Habitat requirements
P. epeiroticus	Occurs in lowland freshwater habitats like slow-flowing rivers, canals and marshes with rich riparian vegetation, at elevations up to 500 metres above sea level (asl) (IUCN SSC Amphibian Specialist Group, 2020a). It is unclear whether the species can survive in modified habitats (IUCN SSC Amphibian Specialist Group, 2020a). Breeding and larval development was reported to take place in waterbodies (IUCN SSC Amphibian Specialist Group, 2020a).
P. kurtmuelleri	Found in open water wetland habitats at elevations up to 1000 metres asl (IUCN SSC Amphibian Specialist Group, 2022b). Breeding was reported to take place in various stagnant and slow-moving waterbodies (IUCN SSC Amphibian Specialist Group, 2022b). The mating season of the species was reported to be April-June, however the presence of warm mineral springs has been reported to allow for all-year activity (Lukanov *et al.*, 2013).
P. shqipericus	Reported from ditches, swamps, marshes and slow-flowing rivers, as well as the along Lake Skadar bordering Albania and Montenegro (IUCN SSC Amphibian Specialist Group, 2020b). It is unclear whether the species can survive in modified habitats, however, based on other species in the genus, it was not considered likely to tolerate extensive threat to its habitat (IUCN SSC Amphibian Specialist Group, 2020b). *P. shqipericus* was reported to be found at elevations up to 500 metres asl (Haxhiu, 1994 in Jablonski, 2011). Breeding and larval development was reported to take place in various wetland habitats (IUCN SSC Amphibian Specialist Group, 2020b).

Table 2. Body size (snout-vent length (SVL)) and mass of *P. epeiroticus, P. kurtmuelleri* and *P. shqipericus*.

Species	Females	Males	References
P. epeiroticus	57 - 83 mm	45 - 72 mm	(Papežík *et al.*, 2021)
	23 - 49 g	20 - 42 g	(Hatziioannou *et al.*, 2022)
P. kurtmuelleri	55 - 104 mm	52 - 85 mm	(Papežík *et al.*, 2021)
	27 - 77 g		(Plitsi *et al.*, 2016)
P. shqipericus	42 - 81 mm	42 - 67 mm	(Papežík *et al.*, 2021)

Distribution

Table 3. Distribution and extent of occurrence of *P. epeiroticus, P. kurtmuelleri* and *P. shqipericus*.

Species	Description	Extent of occurrence
P. epeiroticus	Restricted to two to 10 locations in western Greece (Valakos *et al.*, 2008 in IUCN SSC Amphibian Specialist Group, 2020a in) and southwestern Albania (Jablonski, 2011; Szabolcs *et al.*, 2017) (Figure 1). Subpopulations are thought to be fragmented due to extensive areas of unsuitable habitat in the species' range (IUCN SSC Amphibian Specialist Group, 2020a).	25 660 km^2
P. kurtmuelleri	Endemic to Europe, distributed throughout much of Greece and Albania (IUCN SSC Amphibian Specialist Group, 2022b), and Bulgaria (Lukanov *et al.*, 2013) (Figure 2).	272 068 km^2
P. shqipericus	Restricted to western Albania and southern Montenegro (Jablonski, 2011) (Figure 3).	10 387 km^2

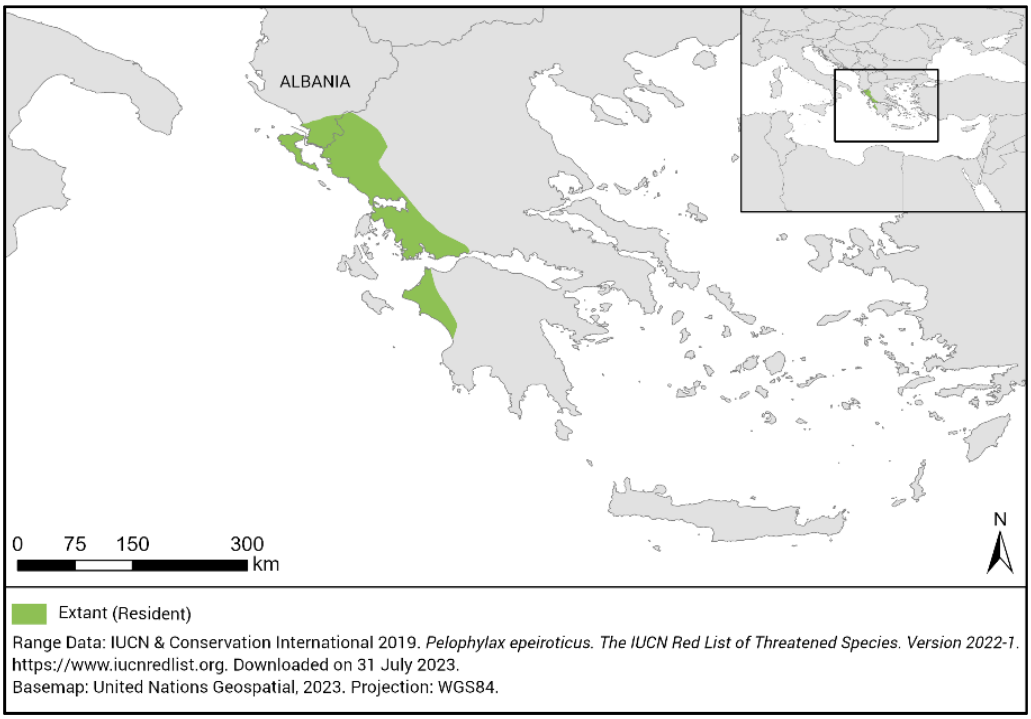

Figure 1: Range of *Pelophylax epeiroticus*[1]

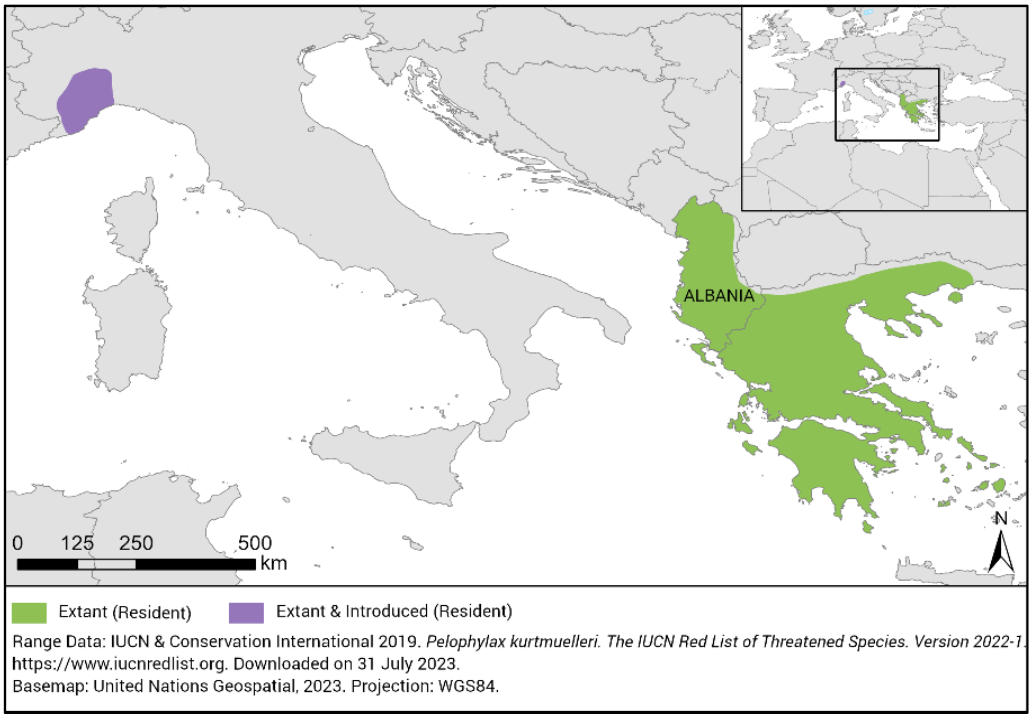

Figure 2: Range of *Pelophylax kurtmuelleri*[1]

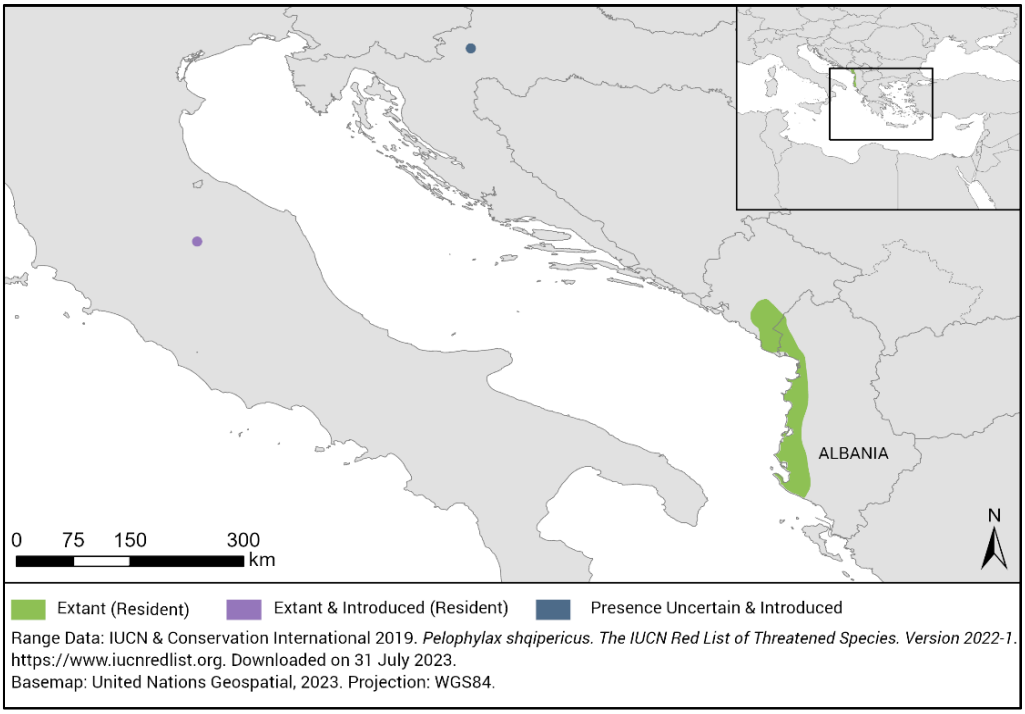

Figure 3: Range of *Pelophylax shqipericus*[1]

[1] The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Population status and trends

Table 4. IUCN Red List category, population trends and additional information for *P. epeiroticus, P. kurtmuelleri,* and *P. shqipericus*.

Species	IUCN Red List category (population trend) (year of assessment)	Justification	Additional notes
P. epeiroticus	Near Threatened (↓) (2019)	Based the species' small extent of occurrence, its restriction to 10 or fewer threat-defined locations, and continuing declines in habitat extent and quality (IUCN SSC Amphibian Specialist Group, 2020a).	The species was reported to be abundant throughout most of its range in 1997 (Gasc *et al.*, 1997 in IUCN SSC Amphibian Specialist Group, 2020a); however, some subpopulations were reported to be declining due to a reduction in habitat extent and quality (IUCN SSC Amphibian Specialist Group, 2020a). No estimates of the rate of population decline could be located.
P. kurtmuelleri	Least Concern (↓) (2019)	Based on the species' wide distribution, tolerance of a variety of habitats, and the unlikelihood of it declining rapidly enough for listing in a more threatened category (IUCN SSC Amphibian Specialist Group, 2022b).	Considered to be common throughout its range in 1997 (Gasc *et al.*, 1997 in IUCN SSC Amphibian Specialist Group, 2022b), but now reported to be declining due to a reduction in the extent and quality of its habitat and harvesting of individuals (IUCN SSC Amphibian Specialist Group, 2022b). No estimates of the rate of decline could be located.
P. shqipericus	Vulnerable (↓) (2019)	Based on the species' extent of occurrence, severely fragmented distribution and the continued decline of habitat extent and quality (IUCN SSC Amphibian Specialist Group, 2020b).	Reported to be "quite rare" (E. Mizsei pers. comm. 2019 in IUCN SSC Amphibian Specialist Group, 2020b). No estimates of the rate of population decline could be located.

Threats: All three *Pelophylax* species appear to be primarily threatened by habitat loss through drought and drainage of wetland habitat for urban development and agricultural activities. These were reported to have caused localised population declines (IUCN SSC Amphibian Specialist Group, 2020a, 2020b, 2022b). Collection and commercial export is considered to be a significant threat to *P. kurtmeulleri* (specifically in northern parts of its range such as Lake Skadar, which crosses the border of Albania and Montenegro), and *P. shqipericus* (again in areas such as Lake Skadar) (IUCN SSC Amphibian Specialist Group, 2020a, 2020b, 2022b).

Other threats include:

- Dam construction and other hydropower development. This was reported to be a major threat to *P. epeiroticus* in particular (E. Mizsel pers. comm. 2019 in IUCN SSC Amphibian Specialist Group, 2020a), however it is considered a likely a threat for all amphibian species in the region (Crnobrnja-Isailović *et al.*, 2022).
- Genetic erosion through hybridization (considered to be a threat to *P. epeiroticus*) (Dufresnes *et al.*, 2017; Jelić *et al.*, 2022; Quilodrán *et al.*, 2015; Radojičić *et al.*, 2015; Szabolcs *et al.*, 2017)
- Accidental introductions of non-native water frog species (considered a threat to *P. kurtmuelleri* and possibly *S. shqipericus*) (Dufresnes *et al.*, 2017; IUCN SSC Amphibian Specialist Group, 2020b, 2022b).
- Aquatic pollution (Dönmez & Şişman, 2021; IUCN SSC Amphibian Specialist Group, 2020a, 2020b, 2022a, 2022b) – considered to be a threat to all three species reviewed.
- The chytrid fungus *Batrachochytrium dendrobatiditis* has been detected *Pelophylax* species found in the Balkans (Vojar *et al.*, 2017).

Albania

***Distribution*:** *P. epeiroticus* and *P. shqipericus* have relatively restricted distributions in Albania. *P. epeiroticus* was reported to only be found in the Sarandë district of south-western Albania, described as the species' northern distribution limit (Jablonski, 2011), and *P. shqipericus* occurs from Lake Skadar bordering Montenegro and along the Adriatic coast of western Albania (Szabolcs *et al.*, 2017) (see Figure 1 and 3). *P. kurtmuelleri* was reported to have a larger, country-wide distribution (Szabolcs *et al.*, 2017); Figure 2).

Population status and trends: No numeric population estimates could be located. Although *P. epeiroticus* has a restricted distribution in Albania, the species was reported to be common within its range (Europe Red List Assessment Workshop September 2019 in: IUCN SSC Amphibian Specialist Group, 2020a) with Jablonski (2011) describing it as very common in Butrint Lake. No information specific to Albania could be found for *P. kurtmuelleri*; the most recent information that could be found was the description of the species as "common throughout its range" by Gasc *et al.*, (1997 in IUCN SSC Amphibian Specialist Group, 2020a). *P. shqipericus* was reported to be rare across its range (IUCN SSC Amphibian Specialist Group, 2020b) with diminishing populations in Albania (Frank *et al.*, 2018), although no numerical estimates of the scale of decline could be located.

Utilisation and trade: All three species are collected for consumption or commercial purposes (IUCN SSC Amphibian Specialist Group, 2020a, 2020b, 2022b). *P. kurtmuelleri* and *P. shqipericus* have been reported

to be significantly threatened by over-harvesting in the northern parts of their ranges, with Lake Skadar, located on the border between Albania and Montenegro, highlighted as an example of a harvest site subject to over-collection in both cases (IUCN SSC Amphibian Specialist Group, 2020b, 2022b). While the 2008 Red List assessment for *P. epeiroticus* reported its harvest in large numbers (Uzzell *et al.*, 2008), the latest assessment did not consider this to be a major threat, having found no evidence to suggest excessive collection in Albania (Europe Red List Assessment Workshop, 2019 in: IUCN SSC Amphibian Specialist Group, 2020).

P. shqipericus is the only species within the genus included in the EU Wildlife Trade Regulations (it was included in Annex D on 22/05/2009). No trade in *P. shqipericus* has been recorded in the CITES Trade Database 2012-2021. This implies either that all wild-sourced trade in *Pelophylax* frogs' legs from Albania is *P. epeiroticus* or *P. kurtmuelleri,* or that there are issues with mislabelling exports of *P. shqipericus.*

EUROSTAT has a specific HS code for frogs' legs (c: fresh, chilled or frozen frogs legs), but this does not differentiate by specific taxa, and no information could be located to confirm whether Albania exports genera other than *Pelophylax* spp. for the frogs' legs trade (the country is also a range State of *Rana dalmatina,* which was identified in Auliya *et al.* (2023) as a species of economic value in Türkiye). Exports of goods under this code from Albania to the EU 2012-2022 comprised 492 tonnes (however it should be noted that the EUROSTAT database does not include information on whether the exporting country is also the country of origin for the product). All trade is thought likely to be wild-sourced (see *Management* section), and Italy was the sole importer (Table 5 (EUROSTAT, 2023a)). Using Veith *et al.*'s (2000) estimate that one kilogram of frogs' legs contains between 20 and 50 individuals, this would amount to 9.84 million – 24.6 million individuals being exported across an 11-year period.

Estimates of trade in frogs' legs are also available from French customs statistics reported in Auliya *et al.* (2023). Between 2010-2019, France imported over 30 000 tonnes of fresh, refrigerated or frozen frogs' legs from several countries, with Albania accounting for 0.7% of trade (219.6 tonnes) (Auliya *et al.*, 2023). According to Veith *et al.*'s (2000) conversion estimate, trade from Albania to France equated to c. 4.4 to 11 million individuals across the 10-year period. The discrepancy between French customs data and EUROSTAT data (the latter of which indicate that Italy was the sole EU importer during this period) may be caused by the way that trade volumes are calculated in each dataset. According to Auliya *et al.* (2023), French customs data calculate import volumes based on origin if the origin is a third country; France's imports of frogs' legs from Albania may therefore have been via Italy.

Table 5. Imports of frogs' legs (Fresh, chilled or frozen; code no. 02089070) to the EU from Albania, 2012-2022 in tonnes (1000 kilograms). No reason could be found to explain the absence of data in 2021.

Importer	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
Italy	57.5	34.5	34.7	55.2	57.9	77.2	84.5	56.2	19.7		14.6	492

Source: EUROSTAT (2023a).

Management: The legal basis for harvest and export for the species is unclear. It appears that only *P. epeiroticus* [as *Rana epeirotica*] was included in Albania's red list of wild flora and fauna (Order No. 1280, 20/11/2013), in which the capture or hunting of listed threatened species is prohibited (Muharremaj, 2016). A moratorium on hunting of wild fauna in the country was declared by law in 2014 (Order No. 7/2014) for a period of two years. The moratorium was extended for five years in 2016 (Order No. 61/2016) and for an additional three years in 2022 (Order No. 60/2022), with exceptions for hunting "overpopulated" species, and for scientific research. The implementation of the hunting ban across the country were

reported to have varied, with a lack of controls and regular monitoring of populations reported in some areas (Ruppert, 2018). It is not clear whether the capture of frogs would be included within the scope of this legislation. While captive breeding of *Pelophylax* spp. including *P. kurtmuelleri* and *P. shqipericus,* has been recorded in other regions of the world (Michaels & Försäter, 2017), evidence of established farms for the commercial breeding of *Pelophylax* spp. could not be found by Auliya *et al.*, (2023), indicating that all trade in these species was wild-sourced.

P. kurtmuelleri and *P. shqipericus* were noted to be found within the Lake Skadar protected area (IUCN SSC Amphibian Specialist Group, 2020b, 2022b) however, it is unclear whether *P. epeiroticus* is also found within any protected areas in Albania. Populations of *P. shqipericus* were reported to not be found within any conservation management plans in the country as of 2019 (EcoAlbania, 2019); no information could be found on whether there are management plans for *P. epeiroticus* or *P. kurtmuelleri.*

Pelophylax bedriagae and *P. ridibundus*/ Türkiye

SPECIES IUCN Red List (pop. trend) (year)	SYNONYMS	COMMON NAME	RANGE STATES (Frost, 2023)
P. bedriagae LC (-) (2021)	*Hylarana bedriagae* (Camerano, 1882); *Rana esculenta var. bedriagae* Camerano, 1882; *Rana levantina* Schneider & Sinsch, 1992	Levantine Frog	Belgium (int.), Egypt, Greece, Iran, Iraq, Israel, Italy (Int.), Jordan, Lebanon, Malta (Int.), Palestine, Russia (Int.), Syrian Arab Republic, Türkiye
P. ridibundus LC (↑) (2008) [Needs updating]	*Rana ridibunda* Pallas, 1771	Marsh Frog	Afghanistan, Armenia, Austria, Azerbaijan, Bahrain, Belarus, Belgium (Int.), Bosnia and Herzegovina, Bulgaria, China (Int.), Croatia, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Italy (Int.), Iraq, Kazakhstan, Kosovo, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Moldova, Montenegro, Netherlands, North Macedonia, Poland, Romania, Saudi Arabia, Serbia, Slovakia, Slovenia, Spain (Int.), Switzerland (Int.), Tajikistan, Türkiye, Turkmenistan, Ukraine, United Kingdom of Great Britain and Northern Ireland (Int.), Uzbekistan

SUMMARY

Globally, *P. bedriagae* was reported to have a stable population while *P. ridibundus* was reported to have an increasing population. *P. bedriagae* is found over a wide area of eastern Türkiye, while *P. ridibundus* has a wider distribution in the centre, west and part of the east of the country. Habitat loss and degradation and overharvesting are considered to be the main threats to populations in Türkiye, with a recent study finding a decline of 20% per year in areas that comprise around a third of Türkiye's frog harvest.

Data from Türkiye's fisheries statistics portal indicates that harvest levels of frogs in the last decade have decreased from a high of 831 tonnes in 2013 to 210 tonnes in 2022, although reporting to this database is noted to have been inconsistent. Every 100 tonnes harvested is estimated to correspond to c. 639 000 individuals.

EUROSTAT data for the HS code for "fresh, chilled or frozen frogs legs" indicates that 1575 tonnes of frogs legs were exported from Türkiye to the EU 2012-2022, with France and Italy as the main importers. Using an estimate that one kilogram of frogs' legs contains between 20 and 50 individuals (Veith *et al.*, 2000), this would amount to 31.5 million - 78.75 million individuals traded being imported to the EU from Türkiye across an 11-year period. It should be noted that EUROSTAT data do not differentiate by specific taxa, and also do not include information on whether the exporting country is also the country of origin for the product. Captive breeding facilities in Türkiye were reported to contribute an average of 45 tonnes annually to frog exports.

Conservation status

Global

Biology: ***P. bedriagae*** is generally found in swampy habitats, in both permanent and flowing waterbodies with rich aquatic vegetation (IUCN SSC Amphibian Specialist Group, 2022a). The species is noted to be highly mobile and has been recorded in artificial waterbodies (S. Gafny pers. comm. 2020 in IUCN SSC Amphibian Specialist Group, 2022a) and modified habitats, including those with organic pollution, and has been reported to be found at elevations up to 2100 metres above sea level (asl) (IUCN SSC Amphibian Specialist Group, 2022a). It is a seasonal breeder, with breeding taking place in permanent waterbodies (IUCN SSC Amphibian Specialist Group, 2022a).

P. ridibundus was reported to be a highly opportunistic species, found in mixed and deciduous forests, grasslands and desert habitats, as well as slightly saline waters off the Absheron Pensinsula, Caspian Sea at elevations up to 2500 metres asl (Kuzmin *et al.*, 2009). The species was reported to be present in modified habitats (Kuzmin *et al.*, 2009).

While *P. ridibundus* was reported to be a seasonal breeder (April to June), with breeding taking place in permanent waterbodies (Lukanov *et al.*, 2013), the presence of thermal springs has been reported to allow for all-year activity in some non-hibernating populations (Lukanov *et al.*, 2013; Sas *et al.*, 2010). Males were reported to start breeding at 2 years of age and females at 3 years of age (Erismis, 2011).

Table 1 provides information on the body sizes and mass of *P. bedriagae* and *P. ridibundus*; females of both species are generally reported to be larger than the males.

Table 1. Body size (SVL) and mass of *P. bedriagae,* and *P. ridibundus*.

Species	Females	Males	References
P. bedriagae	45 – 105 mm	43.6 – 96 mm	(Başkale *et al.*, 2018)
	11 – 95 g	8.7 – 80 g	
P. ridibundus	38 – 117 mm	48.2 – 111 mm	(Gül *et al.*, 2011; Papežík *et al.*, 2021)
	33 – 175 g	36 – 138 g	(Mayer *et al.*, 2013)

Distribution

P. bedriagae is widespread in the eastern Mediterranean, ranging from Greece to Iran (IUCN SSC Amphibian Specialist Group, 2022a) (Figure 1). ***P. ridibundus*** is widespread in western, central, and eastern Europe, ranging as far as eastern Kazakhstan (Kuzmin *et al.*, 2009) (Figure 2).

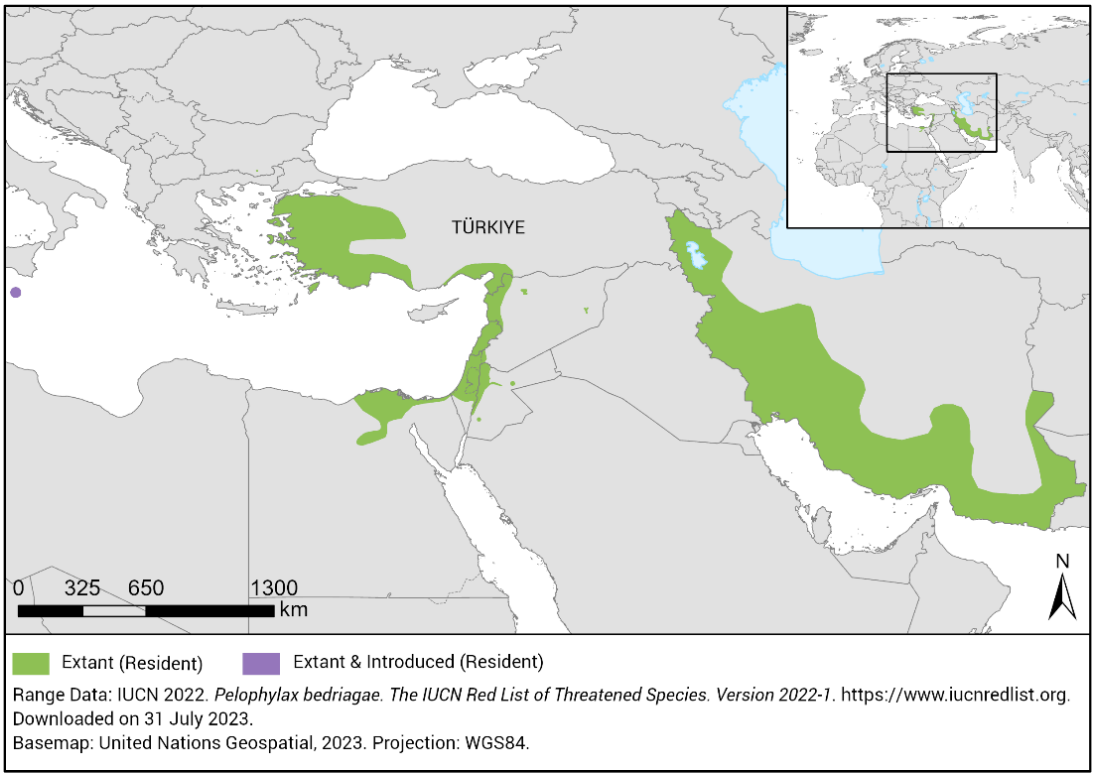

Figure 1: Range of *Pelophylax bedriagae*[2]

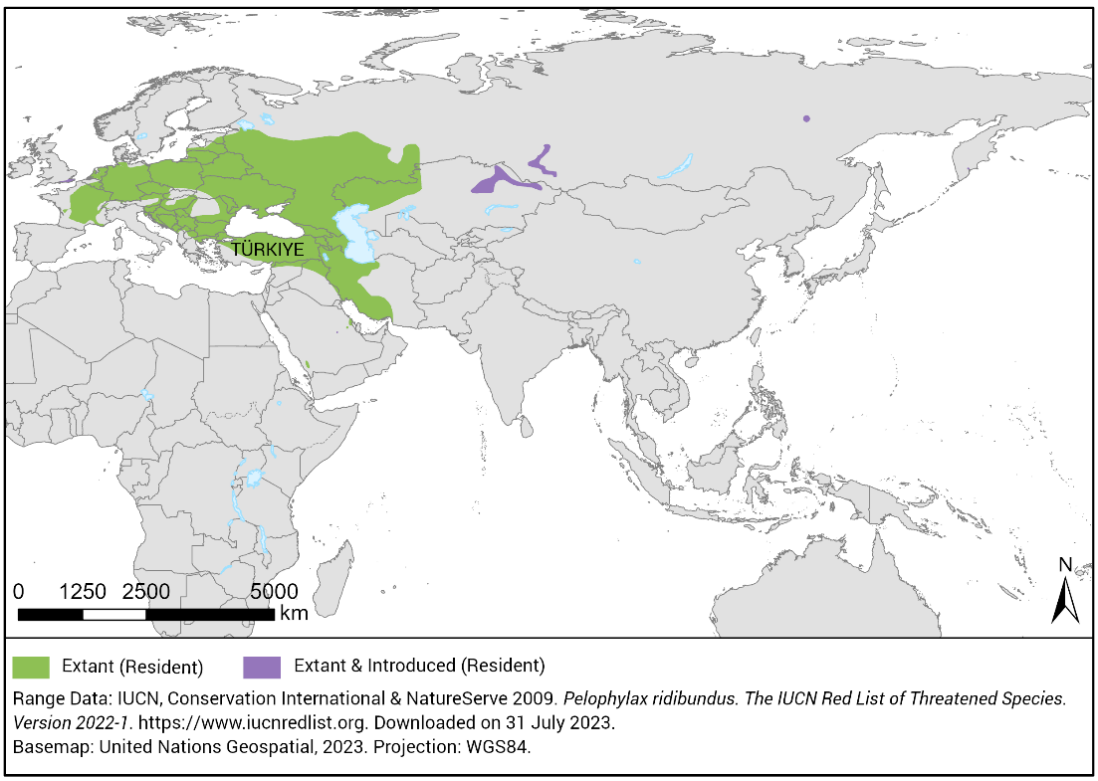

Figure 2: Range of *Pelophylax ridibundus*[2]

[2] The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by Parties. Final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined. Final status of the Abyei area is not yet determined.

Population status and trends

Table 2. IUCN Red List category, population trends and additional information for *P. bedriagae* and *P. ridibundus*.

Species	IUCN Red List category (population trend) (year of assessment)	Population trend	Justification	Additional notes
P. bedriagae	Least Concern (-) (2021)	Stable	Based on the species being widely distributed and tolerant of a wide range of habitats, its presumed large population, and that it is unlikely to be declining rapidly enough for listing in a more threatened category (IUCN SSC Amphibian Specialist Group, 2022a).	Although no population estimates were identified, *P. bedriagae* has been reported to be generally common to abundant in humid areas (IUCN SSC Amphibian Specialist Group, 2022a). Some localized declines and extirpations have been reported in Israel and Türkiye (IUCN SSC Amphibian Specialist Group, 2022a; Başkale & Kaya, 2012).
P. ridibundus	Least Concern (↑) (2008) [Needs updating]	Increasing	Based on the species being widely distributed and tolerant of a wide range of habitats, its presumed large population, and the unlikelihood of it declining rapidly enough for listing in a more threatened category (Kuzmin *et al.*, 2009).	Noted to be generally common or abundant in its area of occurrence (Kuzmin *et al.*, 2009).

Threats: Both *Pelophylax* species appear to be primarily threatened by habitat loss through drought and drainage of wetland habitat for urban development and agricultural activities, which were reported to have caused localised population declines (IUCN SSC Amphibian Specialist Group 2022a; Kuzmin *et al.*, 2009). Collection and commercial export was also considered to be a significant threat to both species; particularly in Türkiye and Egypt for *P. bedriagae*, and in "eastern Asia, the former Yugoslavia, and possibly in Romania and Türkiye" for *P. ridibundus* (IUCN SSC Amphibian Specialist Group, 2022a; Kuzmin *et al.*, 2009).

Other threats include:

- Dam construction and other hydropower development (Crnobrnja-Isailović *et al.*, 2022).
- Invasive species; *P. bedriagae* was reported to be threatened by the introduction of species like *Silurus glanis* (Wels Catfish) and *Pontastacus leptodactylus* (crayfish species) in the western Aegean region (Başkale & Kaya, 2012).
- Aquatic pollution in some industrial areas was reported as a potential threat to *P. ridibundus* populations in Türkiye (Kuzmin *et al.,* 2009).
- The chytrid fungus *Batrachochytrium dendrobatiditis*, which has been detected in parts of *P. bedriagae's* range in Israel (IUCN SSC Amphibian Specialist Group, 2022a) and *Pelophylax* species found in the Balkans (Vojar *et al.*, 2017).

Türkiye

Distribution: *P. bedriagae* has been reported to be found in eastern Türkiye along the Aegean coast and southern parts of the Anatolian highlands (Özeti & Yilmaz, 1994 in Başkale *et al.*, 2018). *P. ridibundus* was reported to be widely distributed in Türkiye, known in all suitable habitats except for a portion of the Turkish Lakes District in southwestern Anatolia (Budak & Göçmen, 2008 in Düşen & Öz, 2013).

Population status and trends: No country-wide population estimates for either species were located, however local declines have been reported in both species. A capture-mark-recapture survey in Karagöl Lake, İzmir Province, estimated that the population of *P. bedriagae* had decreased from 245 individuals in 2006 to 54 individuals in 2009; this was primarily thought to be a result of the introduction of non-native catfish and crayfish (Başkale & Kaya, 2012). A second study site, Soğanharimi pond (also in İzmir Province) was destroyed entirely during the study period as a result of development, leading to the extirpation of the species at that site (Başkale & Kaya, 2012). A population of *P. ridibundus* in Lake Akören of Konya Province with an estimated 2007 individuals in 2005 was noted to have considerably declined when compared to a baseline estimation of 3532 individuals in 1999 (Erismis, 2011; Kaya & Erismis, 2001). Both the 1999 survey and 2005 survey found a male bias in the sex ratio of the populations; it was suggested that this could have been partially caused by commercial collectors preferring larger (female) individuals (Erismis, 2011).

Çiçek *et al.*, (2021) used a capture-mark-recapture methodology to assess populations *Pelophylax* spp. at five harvested locations in the Seyhan and Ceyhan deltas, areas which were reported to have comprised c. 35% of all frog harvest in Türkiye. They found a population reduction of approximately 20% per year between 2013-2015, with models estimating a 90% extinction risk over 50 years (Çiçek *et al.*, 2021).

Utilisation and trade: *Pelophylax* species have been harvested for over 40 years in Türkiye (Akın & Bilgin, 2010; Kürüm, 2015 in Çiçek *et al.*, 2021), for local consumption but principally for international trade, primarily to western Europe (Şereflişan & Alkaya, 2016; Çiçek *et al.*, 2021).

Harvest data on the volume of frogs caught in the country is available through Türkiye's fisheries statistics portal (Tüik 2023), although Çiçek *et al.*, (2021) notes that reporting by harvesters and export companies has been inconsistent. Volumes of frogs reported to have been caught 2012-2022 are shown in Table 3. Using the average maximum weight of males and females of *P. ridibundus* reported in Mayer *et al.*, (2013), every 100 tonnes harvested represents a minimum of c. 639 000 individuals.

Table 3. Quantity of frogs (in tonnes) caught among provinces for 2012-2022.

Province	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
Adana	200	526	449	260	242	286	218	231	185	193	44	**2834**
Bursa	40			20	4							**64**
Denizli	25											**25**
Diyarbakır											7	**7**
Edirne	250	300	288	255	240	261	269	223	105	41	159	**2391**
Hatay	22	4.6	5									**31.6**
Kahramanmaraş	75											**75**
Samsun	7											**7**
Sinop	5											**5**
Tekirdağ	20											**20**
Trabzon	4											**4**
Total	**648**	**831**	**742**	**535**	**486**	**547**	**487**	**454**	**290**	**234**	**210**	

Source: Tüik (2023).

According to EUROSTAT data, imports of frogs' legs under HS code 02089070 (frogs legs; fresh, chilled or frozen) from Türkiye to the EU 2012-2022 comprised 1575 tonnes, with France and Italy as the main importers (Table 4; EUROSTAT, 2023b). Using Veith *et al.*'s (2000) estimate that one kilogram of frogs' legs contains between 20 and 50 individuals, this would amount to 31.5 million- 78.75 million individuals. EUROSTAT data do not differentiate by specific taxa; it should also be noted that the HS code does not differentiate between captive bred or wild-sourced frogs, as well as whether the exporting country is also the country of origin for the product. Captive-bred farms in Türkiye were reported to contribute to an average of 45 tonnes annually to frog exports (see *Management* section).

Imports into France specifically are also available in French customs statistics reported in Auliya *et al.*, (2023). These data indicate that Türkiye was the third largest supplier of frogs' legs to the EU between 2010-2019, accounting for 3.4% imports (EUROSTAT, 2020 in: Auliya *et al.*, 2023) (the two largest suppliers were Indonesia and Viet Nam). France was reported to have imported 1017 tonnes of fresh, refrigerated or frozen frogs' legs from Türkiye over this period (Auliya *et al.*, 2023,) which, using Veith *et al.*'s estimate, is the equivalent of approximately 20.3 million – 50.9 million individuals.

Table 4. Imports of frogs' legs (Fresh, chilled or frozen; HS code no. 02089070) to the EU from Türkiye, 2012-2022 in tonnes (1000 kilograms).

Importer	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
France	76.6	58.8	57.6	68.8	88.2	69.9	76.6	106.3	41.8	95.9	84.1	824.8
Italy	113.2	121.1	102.1	72.3	46.9	36.6	41.2	78.2	38.4	64.4	26.1	740.6
Spain				0.2	0.8	1.2	1.7	1.4	0.9	1.5	1.8	9.46
Total	189.8	180	159.7	141.3	135.9	107.8	119.5	186	81.1	161.8	112	1575

Source: EUROSTAT (2023b).

Management

Captive breeding: According to Kurum (2015 in Çiçek *et al.*, 2021), approximately 12 frog farms have been established in Türkiye. These farms were reported to contribute an average of 45 tonnes annually to frog exports (TUIK Fisheries Statistics, 2018 in Çiçek *et al.*, 2021), which appears to comprise only a small proportion of exports described above. Several farms were noted to breed *P. ridibundus*, including a farm in Aydincik reported to be Türkiye's first established frog farm (Alkaya *et al.*, 2018), and in Adana, Istanbul (Tatlı *et al.*, 2022), and Mersin (Dökenel & Özer, 2019).

Illegal trade: A newspaper report in Türkiye highlighted a case of large-scale illegal harvesting and sale of frogs to frog farms in 2017 (Shaheen, 2017).

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