THE GOULANDRIS NATURAL HISTORY MUSEUM
GREEK BIOTOPE/WETLAND CENTRE
UNIVERSITY OF ATHENS - ARISTOTLE UNIVERSITY OF THESSALONIKI - UNIVERSITY OF PATRAS

Directive 92/43/EEC
THE GREEK HABITAT PROJECT
NATURA 2000: AN OVERVIEW

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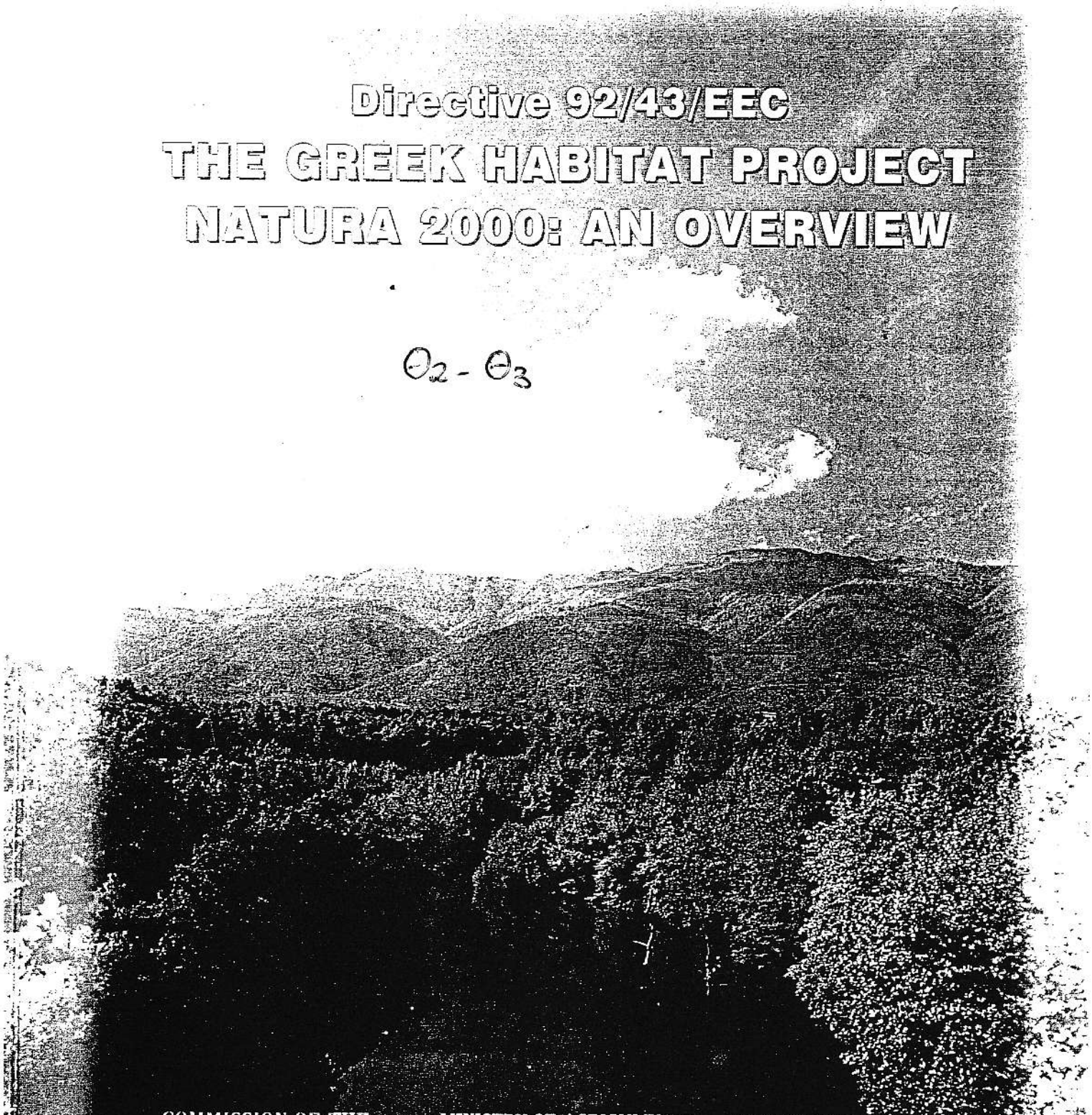

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E.5. AMPHIBIANS

by E. Valakos and B.P. Chondropoulos

E.5.1. Introduction

According to up-to-date information, at least 4,320 living and about 150 fossil species of amphibians have been recorded all over the world. They are classified into 11 orders but only three of them include the recent forms: (a) Apoda or Gymnophiona (the limbless amphibians or caecilians) comprising about 160 species; (b) Urodela or Caudata (the tailed amphibians, i.e. the salamanders and newts) composed of 360 species, and (c) Anura (the tailless amphibians, i.e., the toads and frogs) consisting of over 3,800 species.

A total of only 50 species of tailed and tailless amphibians are known to live in Europe, west of the Ural mountain chain. As a result of historical and recent environmental factors, the southern parts of the continent (the Iberian, Italian and Balkan peninsulas) are by far richer in species than the central and northern parts. Also, the southern populations of these species that also occur in the north are more numerous, larger and healthier in structure (i.e., with a higher percentage of young individuals). Only taxa quite tolerant to the cold have larger populations in the north but these are often very isolated.

In Greece, 17-18 species occur (the exact number depends on the clarification of the taxonomic status of the newt populations formerly classified as *Triturus cristatus*). The anurans are represented by 12 species of toads and frogs belonging to 5 genera of the families Discoglossidae (or Bombinatoridae), Pelobatidae, Bufonidae, Hylidae and Ranidae. All 5-6 Greek tailed amphibians belong to 2 genera of the family Salamandridae. Since the zoogeography and systematics of at least some of the Greek species are insufficiently known, the subspecific division is somewhat unclear. However, at least 2-3 subspecies are considered to be endemic to Greece and some others endemic to Greece and the adjacent Balkan countries.

During the last 30 years an obvious decline in all European species of amphibians has been observed. This alarming situation is more remarkable in the countries of central and northwest Europe where a percentage of 15-33% of each countries' species are endangered or about to become extinct, and the remainder are mostly in sharp decline. Most threatened taxa seem to be the anurans of the genera *Bombina, Alytes, Bufo* and *Hyla*. In southern Europe, the conditions are somewhat better but many cases of locally or more widely destroyed or declining populations are known. At the species level, the cave-dwelling salamanders *Hydromantes* and *Proteus*, and some species of the anuran genera *Discoglossus, Pelobates, Hyla* and *Rana* are in rapid decline.

The reasons for this degradation are either natural or anthropogenic. In the first case, climatic changes and some natural processes leading to habitat alteration (e.g., the aging of the lakes and ponds) are the main reasons. However, these factors as well as the natural enemies of amphibians (predators, parasites) cannot result in a species disappearing from an area

unless human interference occurs (in some cases, however, climatic changes may be responsible of such an extinction). Human activities are by far more critical to the survival of amphibian species and populations, affecting both the animals themselves and their environment. They cause: a) loss of habitats (due to drainage, banking-up, rubbish tipping, etc.); b) pollution of surface and underground water (by acid rain, agricultural residues and byproducts, and untreated household and industrial wastes); c) breaking-up of habitats (due to urbanization and road construction) often forming fatal obstacles for many amphibians during their seasonal migrations; d) disturbance (due to noisy human activities which may cause a serious negative effect on their reproductive process); e) overcollection for trade, scientific and educational purposes, and f) introduction of native or foreign amphibians and other animals (usually causing competitive interactions between the local and the introduced animals or alterations in the genetic construction of the natural populations).

The status of the amphibians in Greece is not well known. At the species level, only one amphibian, the Luschan's salamander, *Mertensiella luschani* (or *Salamandra luschani*), is mentioned in the Red Data Book of Threatened Vertebrates of Greece as "Rare". Although it is generally accepted that in Greece many well-conserved or moderately affected amphibian habitats are still retained, many valuable areas have been lost or seriously damaged during this century. Extensive damage due to the acquisition of cultivated land, reclamation work, water intake, rubbish dumping, pollution from excess pesticides, olive-press waste, household and industrial waste, and eutrophication owing to excessive use of fertilizers and detergents, are some of the destructive impacts on Greek wetlands and other internal water bodies. Massive export of frogs is another threat; tens of tons amounting to some millions of individuals leave the country every year. Various kinds of disturbance have also detrimental effects on many amphibian populations, especially those living in the vicinity of urbanized or otherwise exploited areas (for tourist development, intensive agriculture, airports or motorways). Coastal and other areas of low and moderate altitude are the most susceptible. Finally, many amphibians, especially toads, are accidentally being killed by traffic mainly during the spring migration to their mating places.

The protective legislation in force in Greece has been proved to be ineffective at preventing the degradation of amphibian populations and their habitats. On the other hand, the information possessed by the Greek people about the role of and the need to protect this animal group and its natural environment seems to be very poor. Environmental education programs are limited and it is absolutely necessary that these become a general and intensive educational practice.

Twenty amphibian species and subspecies living in the proposed sites were recorded in the Greek "Natura 2000" database. They constitute 57.1% of the total number of the known amphibian taxa in Greece. Among the 20 taxa, 4 are included in Annex II to Directive 92/43/EEC, and the rest were recorded in the database as Other and Greek Important Species. Of these, 8 are listed in Annexes IV and V of the directive. The only amphibian record in the Red Data Book of Threatened Vertebrates of Greece is among the 20 recorded amphibians in the database. Moreover, 66% of the Greek endemic taxa (2 taxa) are also recorded. All 20 taxa are protected by the Bern Convention (Appendices II or III) and 12 of them (60%) by the Greek Presidential Decree 67/1981. Only one taxon is registered in the European Red List of Globally Threatened Animals and Plants (1991), and none in the IUCN Red List of Threatened Animals (1988). Moreover, 4 taxa (20%) are endemic to Greece and the adjacent Balkan countries, 5 (25%) have isolated populations in Greece, and 9 (45%) are at the limits of their distribution areas in Greece. In a previous survey (the CORINE-Biotopes Project) only 9 of the 20 species were referred.

The 20 evaluated amphibian taxa have been found in 217 sites, i.e. in over 73% of the total number of proposed "Natura 2000" sites. The four Annex II taxa have been recorded from 80 sites (27%). Only 4 of the 80 sites occur on islands, and 63 (83%) lie in the northern mainland (Thraki, Makedonia, Ipeiros and Thessalia). None of the Annex II taxa are distributed in Peloponnisos. The Other Important and Greek Important Species were reported from 192 sites (65%), 72 of which (37.5%) are insular sites.

Although 8 out of the 20 taxa are not found in any other country of the EU, only 4 of them are mentioned in the Directive 92/43/EEC. The 4 omitted taxa (*Triturus alpestris veluchiensis, T. vulgaris graecus, Rana balcanica*, and *R. epeirotica*) are endemic either to Greece or the Balkans. This situation justifies the accession of these and perhaps other Greek taxa in the lists of taxa of Community interest. According to what has been mentioned so far, is obvious that the accession of more of the amphibians present in Greece in the lists of the directive is required.

E.5.2. Amphibians of Greece listed in Annex II to Directive 92/43/EEC

Mertensiella luschani (Steindachner, 1891)
Class: Amphibia, Order: Caudata, Family: Salamandridae

Synonyms: *Salamandra luschani*
Common names: Luschan's salamander - Καρπαθοσαλαμάνδρα or Σκουκούταβλος

Description: The total body length can reach 13 cm, with the snout-vent length being slightly greater than the tail length. The body is slender with a thin, rather cylindrical tail, very prominent eyes, smooth skin and narrow but prominent paratoid glands. There are tiny prickles on the back and throat, especially in males which also always have an obvious soft "spike" on the upper surface of tail base. The base colour is brownish or orange above with dark brown blotches and/or small yellowish spots. Flanks are paler or whitish-yellow and belly flesh-coloured with lighter markings. Throat yellowish and underside of tail orange-yellow. Geographical variation in colouring is known to occur.

Ecology - habits: Fairly quick-moving for a salamander. Often found in quite dry habitats such as phrygana or near seasonal small water courses, and in Megisti island, it is also encountered in places related to human activities. Active from November (beginning of the rainy period) to April and its daily activity is related to air humidity. Usually moving during the night and when the humidity is over 60%. During the rainy or damp, cloudy days it is also active in the morning, otherwise it remains hidden under stones or in crevices of dry-stone walls. It is a widely foraging predator and feeds mainly on arthropods and molluscs. Breeding takes place during the winter (personal observation) but our knowledge of its reproduction is limited. It apparently gives birth to fully-developed young. The way of aestivation is also unknown; it probably aestivates deep in the ground from April to November.

Distribution: This species is distributed on the islands of Megisti (Kastellorizo), Karpathos, Saria and Kasos, all in the southeastern Aigaio Pelagos (Aegean Sea). It is the only tailed amphibian distributed on the islands in this area.

Occurrence with a high degree (A or B) for Conservation and/or Global Assessment in the proposed "Natura 2000" sites:

NUTS I	NUTS II	SITE CODE	DESIGNATION TYPE
Nisia Aigaiou, Kriti	Notio Aigaio	GR4210001 GR4210002 GR4210003 GR4210004	IBA Game refuge 6% Game refuge 21%, IBA

Status and reasons for decline: *Mertensiella luschani* is a threatened species included in the Red Data Book of Threatened Vertebrates of Greece, under the category of "Rare". The population on Kasos island is the most vulnerable due to its small size. Habitat destruction and collection of individuals are the main threats to this salamander.

Protective legislation: This species is protected by the Greek Presidential Decree 67/1981 and the Bern Convention (Appendix II).

Selected references:

Arnold, E.N., J.A. Burton and D.W. Ovenden. 1978. A field guide to the Reptiles and Amphibians of Britain and Europe. Harper Collins Publ., London.

Diesener, G. and J. Reichholf. 1986. Lurche und Kriechtiere. Mosaik Verlag, München.

Engelmann, W.E., J. Fritzsche, R. Gunther and F.J. Obst. 1985. Lurche und Kriechtiere Europas. Neumann, Leipzig.

Polymeni, R.M. 1994. On the biology of *Mertensiella luschani* (Steindachner, 1891): A review. Mertensiella 4: 301-314.

Tzannetatou-Polymeni, R. and B. Chondropoulos. 1992. *Salamandra luschani* (or *Mertensiella luschanni*). p. 110-111. In: Karandinos M. (ed.). The Red Data Book of Threatened Vertebrates of Greece. Hellenic Zoological Society & Hellenic Ornithological Society, Athens. 356 p.

Triturus cristatus (Laurenti, 1768)

Class: Amphibia, Order: Caudata, Family: Salamandridae

Common names: Warty or Crested newt - Χτενοτρίτωνας

Description: A morphologically variable large-sized newt (the second largest in Europe) with dark, more or less warty skin. The total body length is up to 14 cm in males and 18 cm in females. Usually greyish or brownish above with scattered darker spots and fine white dots on flanks and throat. Belly yellow-orange or reddish-orange, with dark spots or variably fused blotches. Breeding males have a high irregularly serrated dorsal crest running to the tail tip but indented at tail base; crest's colour and spotting is similar to those of dorsal area. In these males tail sides have a whitish or bluish stripe. Populations of this newt from the S Balkans and NW Asia Minor (previously recognized as the subspecies *Triturus cristatus karelinii* and recently as the full species *T. karelinii*) have smoother skin, a bluish tinge in dark body areas, little stippling on flanks, a pale throat with dark spots and rather small spots on the belly.

Ecology - habits: This newt is usually a dweller of stagnant water (pools and small lakes) with abundant vegetation where it often lives throughout the year (however terrestrial populations also exist, becoming aquatic only during the breeding season). Encountered from sea-level up to 2000 m; this altitudinal range also applies to the Greek populations. Outside the breeding season, individuals are solitary, being active both by day and night. Prey consists of eggs and larvae of other amphibians and water insects. Males defend their territories. Sexual maturity is attained at the age of about 3 years. During the reproductive period (March - June) females lay 200-300 single, fertilized eggs, wrapping them carefully in plant leaves. The larval stage lasts about 3 months.

Distribution: According to recent opinions the Greek crested newts belong to *Triturus karelinii* or to this species and to a form of *Triturus carnifex*. Because of insufficient knowledge on the systematics of the S Balkan populations traditionally classified as *T. cristatus*, the real distribution of this newt in Greece remains unclear. However, we could say that Greek *Triturus*

"cristatus", i.e., all newts other than the taxonomically well-defined *T. alpestris* and *T. vulgaris*, have been recorded from the north of the country (Ipeiros, Thessalia, Makedonia, Thraki) and on the island of Kerkyra (Corfu).

Occurrence with a high degree (A or B) for Conservation and/or Global Assessment in the proposed "Natura 2000" sites:

NUTS I	NUTS II	SITE CODE	DESIGNATION TYPE
Voreia Ellada	Anatoliki Makedonia, Thraki	GR1110001 GR1110002 GR1110003 GR1110005 GR1140002	Game refuge 38%, Ramsar, IBA, SPA IBA, SPA Game breeding station 3%, Game refuge 58% IBA
	Kentriki Makedonia	GR1260007	Natural monument 38%, Controlled hunting area 62%
	Thessalia	GR1410002	
Kentriki Ellada	Ipeiros	GR2130001	Core strict 27%, Peripheral zone 73%, Game refuge 9%, IBA, SPA

Status and reasons for decline: It is a declining species in most of its European distribution area. For the time being it seems not to be threatened in Greece, but some lowland populations are very susceptible because of their habitat degradation (lowering of the water-table or full drainage, eutrophy and pollution). It seems to be more sensitive to pollution than other newt species.

Protective legislation: *Triturus cristatus*, as well as *T. carnifex* and *T. karelinii*, are protected by the Bern Convention (Appendix II).

Selected references:

Arnold, E.N., J.A. Burton and D.W. Ovenden. 1978. A field guide to the Reptiles and Amphibians of Britain and Europe. Harper Collins Publ., London.

Ballasina, D. 1984. Amphibians of Europe. David & Charles, London.

Gruber, U. 1994. Amphibien und Reptilien. Franckh-Kosmos, Stuttgart.

Hellmich, W. 1962. Reptiles and Amphibians of Europe. Blanford Press, London.

Honegger, R.E. 1981. Threatened Amphibians and Reptiles in Europe. Akademische Verlagsgesellschaft, Wiesbaden.

Sotiropoulos, K., A. Legakis and R.M. Polymeni. 1995. A review of the knowledge on the distribution of the genus *Triturus* (Rafinesque, 1815) in Greece. Herpetozoa 8(1/2): 25-34.

Bombina bombina (Linnaeus, 1761)
Class: Amphibia, Order: Anura, Family: Discoglossidae

Common names: Fire-bellied toad - Κοκκινομπομπίνα

Description: A small toad with adult snout-vent length usually less than 5 cm, a dorsoventrally flattened body and densely tuberculated skin on the entire upper body surface. Dark-coloured above, sometimes greenish-grey or greenish-brown with darker green markings, and with relatively smaller and less spiny tubercles than in the similar species *Bombina variegata*. Underside shows a pattern of irregular, variably extended single or fused black areas with scattered white dots and small spots, sharply contrasting to respective bright red or red-orange coloured areas. Finger tips are not usually brightly coloured. Pupil is round or triangular. No visible tympanic membrane. There is one internal vocal sac and webbing in the hind feet reaches the tips of the toes. Compared to *B. variegata* it is usually smaller-sized and has a narrower head. In areas where the two species live in sympatry hybridization is often observed giving individuals or populations with intermediate characters.

Ecology - habits: Usually lives in lowlands (0-150 m), encountered in shallow, temporary or permanent, still waters, less usually in slow-moving waters, and sometimes near human settlements. A rather aquatic, diurnal and gregarious toad. Its food consists of insects, worms and other small invertebrates. When disturbed this toad flattens its body and raises and outwardly turns its distal limb parts to expose bright colours as a warning sign. Hibernation lasts from October/November to March. During the breeding season (April-July) males usually call in choruses emitting a deep, sorrowful mating call which is repeated fewer than 40 times per minute. The sexual embrace (amplexus) is inguinal. It is an oviparous species with external fertilization; a few tens of fertilized eggs attach to the water vegetation, or the bottom of the water body, singly or in small groups (5-15 eggs). More than one clutch per season is produced.

Distribution: Known only from a few areas of Thraki.

Occurrence with a high degree (A or B) for Conservation and/or Global Assessment in the proposed "Natura 2000" sites:

NUTS I	NUTS II	SITE CODE	DESIGNATION TYPE
Voreia Ellada	Anatoliki Makedonia, Thraki	GR1110001	Game refuge 38%, Ramsar, IBA, SPA

Status and reasons for decline: A species already extinct or in decline in some parts of central and northern Europe. It is not mentioned in the Red Data Book of Threatened Vertebrates of Greece although little is known about the situation of its population in our country. Habitat alteration or even loss due to land reclamation work, road construction and pollution from pesticides, excess of fertilizers, etc., possibly affect the Greek populations of this taxon. The very limited distribution of this species in Greece needs detailed study and monitoring of all its populations.

Protective legislation: *Bombina bombina* is included in Appendix II of the Bern Convention.

Selected references:
Arnold, E.N., J.A. Burton and D.W. Ovenden. 1978. A field guide to the Reptiles and Amphibians of Britain and Europe. Harper Collins Publ., London.
Ballasina, D. 1984. Amphibians of Europe. David & Charles, London.
Gruber, U. 1994. Amphibien und Reptilien. Franckh-Kosmos, Stuttgart.
Hellmich, W. 1962. Reptiles and Amphibians of Europe. Blanford Press, London.
Honegger, R.E. 1981. Threatened Amphibians and Reptiles in Europe. Akademische Verlagsgesellschaft, Wiesbaden.
Matz, G. and D. Weber. 1983. Guide des Amphibiens et Reptiles d'Europe. Delachaux & Niestle, Paris.

Bombina variegata (Linnaeus, 1758)

Class: Amphibia, Order: Anura, Family: Discoglossidae

Common names: Yellow-bellied toad - Κιτρινομπομπίνα

Description: A small toad very like *Bombina bombina* with snout-vent length up to 5.5 cm, a dorsoventrally flattened body and densely tuberculated skin on the entire upper body surface. Differs from *B. bombina* in its ventral colour pattern which is characterized by irregular, variably extended single or fused black to bluish-grey areas, with or without scattered white dots and small spots, sharply contrasting to respective bright yellow or orange coloured areas with scattered black dots. Individuals with almost entirely black bellies may exist. The upper body surface is brown, greyish-brown, grey, yellowish-brown or olive-coloured, with large, spiny warts. Finger-tips, and rarely a small blotch on the rear femur surface, are yellow or orange. Pupil is round, triangular or heart-shaped. Vocal sacs are absent. Tympanic membrane and webbing in hind feet are as in *Bombina bombina*.

Ecology - habits: It lives in areas with altitudes of 100-1900 m. When this taxon occurs in sympatry with *Bombina bombina* it tends to prefer higher areas. Adapted to a variety of natural and man-made habitats with stagnant or flowing shallow water. A gregarious, largely diurnal animal (although night activity has also been reported). It preys on small vertebrates. When disturbed it reacts by throwing up its limbs to show belly colours or even turns itself upside down. During the breeding season (April-August) males call in choruses emitting a gentle, rather musical mating call, brighter and faster than that of *B. bombina* (more than 40 calls per minute). The sexual embrace (amplexus) is inguinal. It is an oviparous species with external fertilization; several tens of fertilized eggs are placed by each female in the environment of the reproduction area in a way similar to that of *B. bombina*.

Distribution: Widespread in the mainland except Peloponnisos.

Occurrence with a high degree (A or B) for Conservation and/or Global Assessment in the proposed "Natura 2000" sites:

NUTS I	NUTS II	SITE CODE	DESIGNATION TYPE
Voreia Ellada	Anatoliki Makedonia, Thraki	GR1120003	Natural monument 1%, Game refuge 6%, Biogenetic reserve
		GR1140001	Natural monument 55%, Game refuge 100%, IBA, SPA, Biogenetic reserve 55%
		GR1140002	
		GR1140003	
		GR1140007	Natural monument 100%, Game refuge 100%, IBA, Biogenetic reserve 100%, SPA
		GR1150004	IBA
		GR1150005	Game refuge 42%, IBA
		GR1110002	IBA, SPA
		GR1110003	Game breeding station 3%, Game refuge 58%,
		GR1110005	IBA, SPA
	Kentriki Makedonia	GR1210001	Game refuge 48%
		GR1240002	Game refuge 18%, IBA
		GR1240003	Game refuge 13%
		GR1250001	Core strict 26%, IBA, Biogenetic reserve, Biosphere reserve 26%, Game refuge 8%, SPA
		GR1250002	Game refuge 20%
		GR1250005	Core strict 100%, IBA, Biogenetic reserve, Biosphere reserve, SPA
		GR1260001	Game refuge 1%, Ramsar, IBA, SPA
		GR1260005	
		GR1260006	Game refuge 34%
		GR1260007	Natural monument 38%, Controlled hunting area 62%,
		GR1260008	IBA, Ramsar, SPA
		GR1270001	Game refuge 6%, IBA
		GR1270005	Game refuge 64%
	Dytiki Makedonia	GR1310001	
		GR1320002	Natural monument 1%, Game refuge 13%, IBA, Biogenetic reserve 1%
		GR1340001	Core strict 25%, Peripheral zone 75%, Game refuge 18%, IBA, Ramsar 25%, Biogenetic reserve 1%, SPA
		GR1340002	Core strict 100%, Ramsar, IBA, SPA
		GR1340003	
		GR1340006	Game refuge 15%
		GR1310002	Core strict 100%, Game refuge 6%, SPA, IBA, Biogenetic reserve 100%
		GR1310003	Core strict 49%, Peripheral zone 51%, Game refuge 21%, SPA, IBA, Biogenetic reserve
	Thessalia	GR1420001	Game refuge 6%, IBA
		GR1410002	
		GR1420003	Aesthetic forest 100%, Conrolled hunting area 80%, IBA, SPA
		GR1420004	Game refuge 16%, IBA
		GR1430002	Aesthetic forest 20%, Biogenetic reserve 20%, IBA

NUTS I	NUTS II	SITE CODE	DESIGNATION TYPE
		GR1440001	Game refuge 29%
Kentriki Ellada	Ipeiros	GR2110002	Game refuge 11%, IBA
		GR2110003	Game refuge 27%, IBA
		GR2130001	Core strict 27%, Peripheral zone 73%, Game refuge 9%, IBA, SPA
		GR2130004	IBA
		GR2130006	
		GR2130007	Game refuge 13%
	Dytiki Ellada	GR2310004	Game refuge 10%
		GR2310010	Game refuge 6%
	Sterea Ellada	GR2430001	Game refuge 50%
		GR2430002	
		GR2450001	Game refuge 9%, IBA
		GR2450002	Game refuge 33%, IBA

Status and reasons for decline: A declining species in most of Europe (in some countries completely extinct); the status of the Greek populations is mostly unknown. Possible threats to this taxon's survival are associated with the degradation of its habitats (drainage, pollution). At the specific level *Bombina variegata* seems to be rather safe in Greece, and therefore it is not included in the Red Data Book of Threatened Vertebrates of Greece.

Protective legislation: It is protected by the Bern Convention (Appendix II).

Selected references:

Arnold, E.N., J.A. Burton and D.W. Ovenden. 1978. A field guide to the Reptiles and Amphibians of Britain and Europe. Harper Collins Publ., London.

Ballasina, D. 1984. Amphibians of Europe. David & Charles, London.

Gruber, U. 1994. Amphibien und Reptilien. Franckh-Kosmos, Stuttgart.

Hellmich, W. 1962. Reptiles and Amphibians of Europe. Blanford Press, London.

Honegger, R.E. 1981. Threatened Amphibians and Reptiles in Europe. Akademische Verlagsgesellschaft, Wiesbaden.

Matz, G. and D. Weber. 1983. Guide des Amphibiens et Reptiles d'Europe. Delachaux & Niestle, Paris.