Action Plan for the Conservation of the Common Midwife Toad *(Alytes obstetricans)* in the European Union

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Preface/Introduction

The common midwife toad, *Alytes obstetricans*, is widespread in Europe but is currently facing population declines in several countries. This European Species Action Plan (EU SAP) has been prepared with the support of the European Commission.

The aim of this EU SAP is to support the development of national or local action plans and conservation measures as appropriate[1]. The purposes of this EU SAP are as follows:

- To provide baseline information about species status
- To provide scientifically-based recommendations to those who can promote and support species conservation
- To establish priorities in species conservation
- To provide a common framework and focus for a wide range of players

The information and proposed conservation actions presented in this EU SAP have been prepared in consultation with a group of species experts from all countries in the midwife toad's distribution range, as well as through a review of available literature. An attempt has been made in this EU SAP to summarise the literature most pertinent to *Alytes obstetricans* conservation. Taxonomy and ecology are briefly covered and distribution, status and threats that it is known to face are outlined. Finally, the conservation actions proposed for the species are presented and recommendations are provided regarding stakeholder participation and the monitoring and review of the Plan.

Within the frame of this Species Action Plan, two meetings with the species experts were held in order to analyze the threats facing the species, develop a conservation strategy and identify the most important actions.

[1] The EU Species Action Plans are not of a binding nature; species action plans are drafted and implemented at the discretion of Member States.

Summary

The common midwife toad is a small, brownish, stocky anuran with a relatively large head. A particular feature of this species is that it mates on land, not depositing its eggs in water. Males carrying the egg mass are easily distinguished as they show extensive parental care for the eggs till the larvae are ready to hatch.

The common midwife toad occupies a great variety of habitats. Its terrestrial habitats include stonewalls, hedgerows, and similar structures in the landscapes and open sites in temperate forests and semi-arid areas. Its breeding sites range from slow-moving water bodies to stagnant, permanent ponds and pools. The midwife toad feeds on terrestrial prey, mostly small, nocturnal arthropods, annelids and molluscs.

The distribution range of the common midwife toad extends from the northern half of Portugal and Spain through most of France, southern Belgium, the south-eastern extreme of the Netherlands, Luxembourg, western and central Germany, and western and northern Switzerland.

The midwife toad's conservation status is "Least Concern" (LC) according to the *IUCN Red List* (Bosch *et al.* 2008) and the *European Red List of Amphibians* (Temple & Cox 2009). However, in a 2009 assessment carried out in the European Union (according to Article 17 of the Habitats Directive), its status was classed as 'unfavourable-bad' for the Alpine, Atlantic and Continental biogeographical regions, and 'unknown but not favourable' in the Mediterranean biogeographical region. On the other hand, it has been reported as 'favourable' in Belgium and Luxembourg.

Populations are stable in Belgium, Netherlands, Luxembourg and in the Mediterranean biogeographical region of France, but declining in Germany and the rest of biogeographical regions of France. For Spain and Portugal, population trends were reported as 'Not Assessed' and 'Unknown', respectively. Regarding Switzerland, the number of midwife toads has significantly declined in recent years.

General habitat loss (including loss of breeding sites) has been the main cause of the decline of *Alytes obstetricans* in many areas. As a consequence, fragmentation of metapopulations might be a serious problem for the species in several parts of its distribution range. Moreover, it seems that stronger declines of populations are occurring at the edges of the midwife toad's European distribution range. Additional mortality of the species due to disease, predation and/or competition by alien species are also important threats to the species. Finally, there is also growing evidence of a link between amphibian decline and climate change.

The overall goal of this European Species Action Plan is to improve the conservation status of the midwife toad (*Alytes obstetricans)* in the European Union with the aim of enabling the species to achieve a favourable status.

In order to achieve this goal, it is necessary to control habitat loss, especially field margins, stonewalls and similar features of agricultural landscapes, as well as to tackle the loss and degradation of ponds and other breeding sites. The mortality caused by introduced species predating tadpoles and the spread of disease, especially *chytridiomycosis* in mountain areas, need to be brought under control.

In order to achieve these objectives, a list of recommended actions has been prepared taking into account the species situation and threats in each country. The actions are divided into six categories: habitat improvement and habitat management, combating habitat fragmentation, reduction of species mortality and population recovery, scientific research, coordination for Action Plan implementation, and public awareness, education and information. These actions are described in Table 3 (Page 27) of this document.

Species' functions and values

The common midwife toad is an essential component of a great variety of natural and semi-natural ecosystems in Europe. From an ecological perspective, like many other amphibians, it is a good ecological indicator since amphibians respond to very slight changes in their environment. Such responses can be useful in revealing habitat fragmentation, ecosystem stress, intensification of agriculture, including changing agricultural methods and high levels of nitrogen and pesticides, as well as various anthropogenic activities.

Action Plan geographical scope and target audience

Within the European Union, this plan is intended to be implemented in Portugal, Spain, France, Luxembourg, Belgium, the Netherlands and Germany.

However, it also includes information from Switzerland thanks to the valuable cooperation of Swiss experts in the drafting of this document.

1. Biological information and status review

1.1 Description of the species

Taxonomy

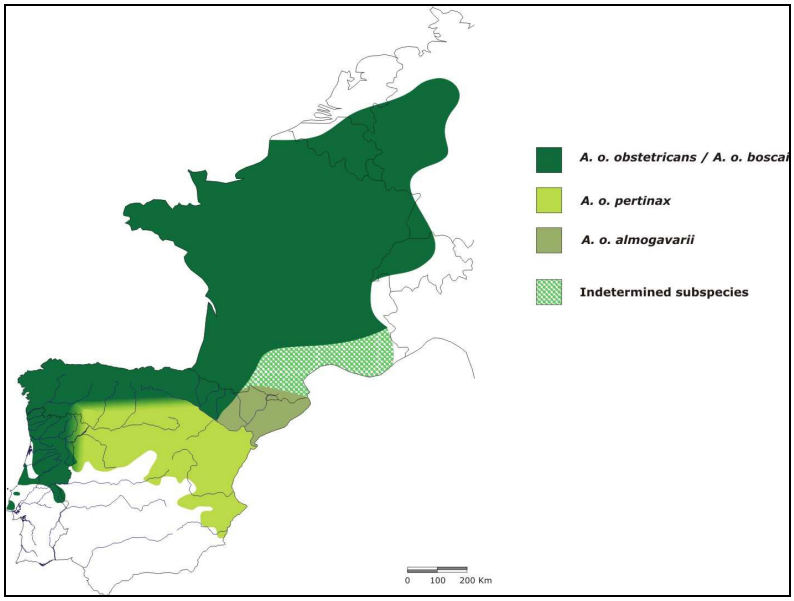
Class: Amphibia
Order: Anura
Family: Discoglossidae[2]
Genus: *Alytes*
Species: *obstetricans*

Alytes obstetricans is part of a genus of toads in the *Discoglossidae* family that are found in most of Europe and north-western Africa.

Currently five species of midwife toad (*Alytes* spp.) and four subspecies of common midwife toad (see Figure 1) have been described. All are present on the Iberian Peninsula, where they are poorly delineated geographically, with large transitional areas and possible hybridization:

- *A. o. obstetricans* is found in all the EU countries where the species occurs.
- *A. o. almogavarii* occupies the eastern Pyrenees and north-eastern part of Spain.
- *A. o. boscai* occupies the centre and north of Portugal and north-western Spain.
- *A. o. pertinax* occurs along the Spanish Mediterranean coast up to the Ebro River at its northern boundary, and inland down to the city of Toledo (central Spain) (Ayllón & Hernández 2009).

Figure 1. Distribution of *Alytes obstetricans* subspecies in Europe (Source: Gonçalves 2007).



[2] According to Sanchiz (1998), *Alytidae* Fitzinger 1843 has a priority date on *Discoglossidae* Günther, 1858 (1845) to name the family including representatives of genera *Alytes* and *Discoglossus*. This is the approach taken in recent revisions of Dubois (2005) and Frost *et al.* (2006).

Description of the common midwife toad

Adults

The common midwife toad is a small, stocky anuran with a relatively large head. Adults of both sexes have a snout-vent length of 35 to 55 mm. The coloration can vary from brown to grey, with small black, brown to olive or green spots. The underside is a dirty white colour, and the throat and chest are often spotted with grey. The skin is covered with warts and/or granulae, with a row of large, often reddish warts extending from the tympanum to the loin area. The eyes are large and have a vertical slit-shaped pupil. Parotid glands are small, and the tympanum is mostly visible. Other large gland complexes are present on the underarms and ankles. The toads have strong, rather short limbs. The fingers of the fore limbs have no interdigital membrane, but do have three metacarpal tubercles, whereas the fingers of the back limbs are without subarticular tubercles, having a small interdigital membrane (AmphibiaWeb 2009, Bosch 2009).

Males are easily distinguished when they carry the egg mass (Bosch 2009). On average, females present a bigger mean size and relatively shorter limbs. Other features that distinguish males and females are: distance between nostrils, distance between the anterior end of the middle metacarpal tubercle and the tip of the third finger, and the distance from the elbow to the third finger tip (AmphibiaWeb 2009). Also, eggs can be perceived through the skin of female's belly (Böll *et al.* 2010, Kordges 2003).

Tadpoles

Tadpoles of this species are pale brown, spotted with darker marks and display typical light golden spots (Bosch 2009). They have a large tail, a ventral spiracle on the front half of the body and a relatively distinct silver stripe in the middle of the belly. Individuals born in summer, which do not metamorphose the same year and hibernate, may reach a significant size (8-11 cm) (Jacob *et al.* 2007, Bosch 2009). In general, tadpoles measure 14-18 mm at the time of hatching and may reach 6-7 cm. They show great plasticity in terms of body size and shape depending on the characteristics of their environment. For example, in ponds with no water currents (no streams) they tend to be rounded, but are more elongated in bodies of flowing water.

1.2 Life history, ecology and habitat requirements

The life history of the midwife toad is completely different from that of most native amphibians. Mating on land, it does not deposit its eggs in water. Males show extensive parental care for the eggs till the larvae are ready to hatch. After hatching, the larvae either metamorphose in late summer or, usually, overwinter in their aquatic habitat before metamorphosing the following year.

Midwife toads are gregarious animals, often gathering together within a hundred meters of the pond where they deposit their larvae (de Wavrin & Graitson 2007). They feed on terrestrial prey, mostly small nocturnal arthropods, annelids and molluscs. The most commonly occurring prey found in their stomachs are spiders and isopods; however, in terms of abundance and depending on the region, the most consumed taxa are Hymenoptera (ants), isopods, spiders,

Coleoptera, Hemiptera and Orthoptera. Juveniles prefer worm-shaped prey. The maximum longevity found in the wild is 7 years for females and 6 for males (Bosch 2009).

Regarding the midwife toad's annual cycle, it leaves its winter retreat in March or April (and even as early as February in Mediterranean regions) and is active until September-October (until November in southern France and northwest Spain).

Reproduction

The breeding season varies depending on geographic area. In Spain, in areas with great seasonality, such as high mountains, it begins in late winter, continuing until early summer. At lower altitudes, the season is much longer, with males carrying eggs evident during most of the year. In mountainous areas, females produce one clutch per year, whereas in lowland areas they may produce two or three (max. four) clutches annually (Böll & Linsenmair 1998; Bosch 2009). North of the Pyrenees, reproduction usually occurs from April to July or August (Fritz & Schwarze 2007, Böll *et al.* 2010).

In northern France and in Belgium, the calling period extends from April to June, and sometimes even into August (Weiserbs & Jacob 2005). Whereas it is not uncommon for it to begin in March in some regions such as north-eastern France (Vacher *pers. comm.*) or western Germany (Kordges 2003). Sometimes, in particularly warm weather, calling may even start in February (e.g. in the Paris region, in central Switzerland), finishing in December (e.g. south of France; ACEMAV 2003). Periods of more intense calling alternate with lulls, which correspond to periods of egg carrying, but not in all populations.

Tadpoles from the first breeding cycle in April-May normally metamorphose in late summer, depending on water temperature, whereas later matings or larvae deposited in cold water result in tadpoles that overwinter and metamorphose between May and August the following year after about a year of larval life (Kordges 2003). In high mountain areas, however, larvae take several years to develop.

<u>Courtship and mating</u>

The mating behaviour of the midwife toad is unusual for a temperate species. Both sexes produce vocalization during sexual encounters, a phenomenon known as 'reciprocal calling'. Fertilization is external and mating is terrestrial (Marquez & Verrell 1991). Males call outside their refuge only at temperatures above 7-13º C. At lower temperatures, they do so from their shelter, where they may breed (Bosch 2009). Males vary their rate of call emission depending on the characteristics of the males nearby. If the competitor is a big male, they respond by increasing their calling emission rate in order to appear more attractive to females, which prefer high calling rates. Females show a preference for low-tone calls, which correspond to large males. The female also calls in response to male calls to facilitate location (especially within shelters) and to demonstrate responsiveness. Female calls are of much lower intensity. Although similar in structure, they are shorter in duration than male calls (Bosch 2009).

An encounter is initiated when the female approaches the male and he clasps her in inguinal amplexus. Then the male begins a laborious courtship sequence (the release of the eggs will not occur until between 15 minutes and 2 hours later). After the first "unkenkrampf[3]" of the

[3] *Unkenkrampf* posture: In this posture, also known as the *unken reflex*, the toad's back is arched, its hind limbs are flexed and the heels pressed together and against its cloacal region (forming a cup-

female, she releases a string of about 40 eggs (20-62) approximately 3 mm in diameter and located between her bent hind limbs (Böll & Linsenmair 1998, Márquez 1993). Then the male digs with his hind legs into the egg mass and twines the egg string around his ankles. Finally, the male, carrying the egg mass, releases the female (Bosch 2009). Males are able to receive up to two more egg clutches from different females within one and a half weeks after their first mating (Böll *et al.* 2010). Altogether, they can go through 1-3 breeding cycles, carrying one or multiple clutches at a time (Böll & Linsenmair 1998).

Parental care

These toad-like anurans are notable for their approach to parenting. Males are very successful caretakers, staying in hideouts with suitable temperatures and high humidity that allow optimal embryogenesis. They usually carry about 65 eggs (20-170). The larger males achieve greater reproductive success, carrying larger numbers of eggs over the season. Their greater success is mainly due to the fact that they mate with more females (Böll & Linsenmair 1998; Bosch 2009).

A study conducted on French populations of common midwife toads in 2003 concluded that in France males carry fewer eggs (mean of 39.5) and their reproductive period is shorter than for the Iberian populations (Bosch 2009). In the case of Dutch populations, males carry 20-100 eggs (van den Broek & Frissen 2009) whereas in German populations, they carry 14-142 eggs (Günther & Scheidt 1996).

While in some populations egg-carrying males approach water in order to keep the clutch damp while they are carrying it, there are other well studied populations where egg-carrying males avoid contact with water prior to the tadpoles hatching (Bosch 2009, Böll *et al.* 2010). Between 15 and 45 days after amplexus, the larvae have developed and can be seen moving inside the eggs carried by the males. At this time, males approach a water body and release the larvae. In contact with water, the larvae hatch within 15-45 minutes to swim freely. Hatching success exceeds 70% (Bosch 2009) or even 80% (Böll & Linsenmair 1998). Larvae remain in the water for a long time until metamorphosis is complete. In high altitude lakes in the Pyrenees (2200 m), larval development is very slow (sometimes up to three years in mountainous areas), but larvae continue to grow and can reach a total length of 86 mm (Bosch 2009).

Habitat

The common midwife toad occupies a great variety of habitats. Very few amphibian species show such a variety of different breeding ponds. It enables *A. obstetricans* to breed in small shallow and sun-exposed waters as well as in deep and cold water bodies, as has been documented for many quarries (Kordges 2003). The species' breeding sites range from slow moving water bodies, to stagnant, permanent ponds and pools, and sometimes even temporary pools.

This species is more demanding when choosing terrestrial habitat, which has to be located close to water. It likes sunny slopes, with sandy, silty or loose soils and sparse vegetation. Walls exposed to the sun, with many cracks, terraces, piles of stones, stone slabs or wood piles are among its ideal habitats (Böll *et al.* 2010). Ditches, gardens with loose soil, corners and

shaped receptacle) (Marquez & Verrell 1991). The head is elevated and the forelimbs are extended while the animal remains immobile.

stone plaques, sunny edges of forests and extensive meadows are able to host populations of midwife toads during the summer. Moreover, its terrestrial habitats include stonewalls, hedgerows, embankments and slopes with small stones and sparse vegetation, open sites in temperate forests and semi-arid areas. In some regions, such as Central Europe and especially the north of the species distribution area, gravel pits and quarries are also common habitats for *A. obstetricans* (Borgula & Zumbach 2003, Böll *et al.* 2010). This is particularly true in North Rhine-Westphalia (western Germany), where such biotopes have become the most important for the species (Kronshage *et al. in prep*., Schlüpmann 2009, Kordges 2003). Midwife toads can also occur in suitable modified habitat such as traditional agricultural land, villages and even urban areas (e.g. Barcelona, Liège, Paris, Ruhrgebiet) (Bosch *et al.* 2009, Böll *et al.* 2010, Kordges *et al.* 1989).

The long larval development restricts it to areas with mainly permanent water bodies, which are often of anthropogenic origin, e.g. basins, fountains, irrigation tanks or reservoirs for fire fighting. Moreover, these water points may present very different characteristics, and may even contain eutrophic water, low oxygen levels or low pH (Bosch 2009).

The midwife toad can be found on siliceous, limestone or clay soils. It occurs at elevations ranging from sea level to 2.500 m a.s.l. in the Pyrenees (Bosch *et al*. 2009, Vences *et al.* 2003), and occupies mainly high rainfall areas. In the northern part of its distribution area (for example, in the Netherlands and Luxembourg), the species prefers frost free, southerly exposed slopes with low vegetation and sufficient open space and place for shelter (Bosman *pers. comm.*, Schley *pers. comm.*, Böll *et al.* 2010). In areas with less rain, especially in the south of its distribution range, the midwife toad occurs almost exclusively in mountainous systems or in areas with impermeable substrata. However, small relict populations can also be found in dry and even semi-arid areas of the central and southern Iberian Peninsula.

Its hiding places include mouse holes, stone heaps and stone walls, erosion cracks, dead wood, underground caves and holes, foundations of buildings, self-burrowed holes and every other kind of hole suitable for shelter. The deepest parts of these shelters are used for hibernation.

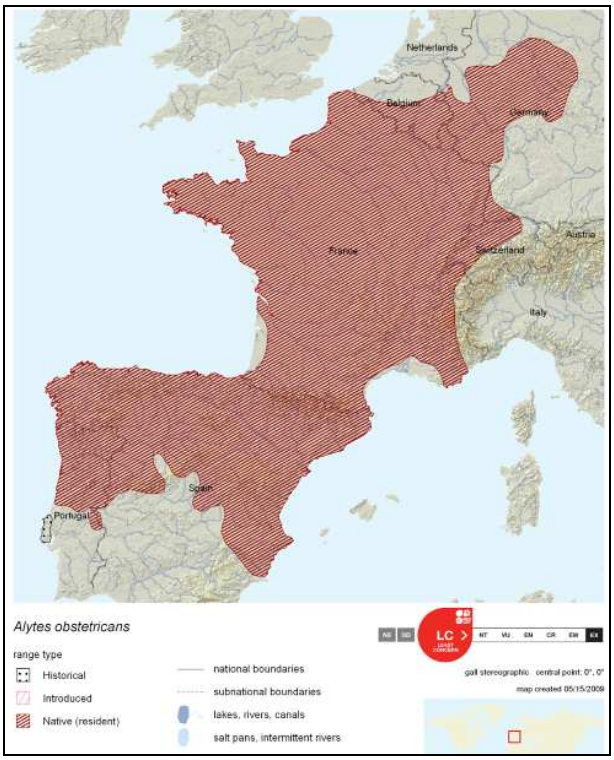
Dispersal

The midwife toad moves over short distances. It rarely colonises new habitats. A study carried out in Switzerland observed that newly colonised habitats are mostly located within a 1.5-km radius of the source population (Ryser *et al.* 2003).

1.3 Distribution, populations size and trends

The common midwife toad ranges from the northern half of Portugal and Spain (where populations are very fragmented), through most of France, to southern Belgium, extreme south-eastern Netherlands, Luxembourg, western and central Germany, and western and northern Switzerland. Populations in coastal Portugal, west of Lisbon, are extinct. The species was introduced in the UK, and there are several established populations.

Figure 2. Distribution of the midwife toad *Alytes obstetricans* in Europe. Source: IUCN 2009.



Portugal. In Portugal, the midwife toad occurs mainly north of the Tagus River, with the exception of one isolated population in the Sao Mamede Mountains (eastern Portugal). Although it is a relatively common species, the increasing destruction of breeding sites and loss of habitat due to urbanization, pollution or agriculture intensification are important threats for some populations, particularly in coastal areas (Gonçalves 2008). According to Loureiro et al. (2008) there are still some fragmented populations along the coastal area west of Lisbon, although some sub-populations could be extinct in this area.

Spain. In Spain, *Alytes obstetricans* is not threatened in its northern distribution range and is still common. Nevertheless, there is growing evidence of local decline due to habitat loss and alien species in the region of Galicia (Galán 2008). In its southern distribution range, the species is severely threatened by alteration to or destruction of water points used for breeding (Bosch 2002). Besides these problems, southern populations are threatened by the introduction of alien species and the fragmentation and isolation of populations (Ayllón & Hernández 2009). In the Catalonia region, *Alytes obstetricans* has disappeared from the Llobregat Delta platform (north-eastern Spain), mainly due to loss of breeding habitats. Currently, there is only one population on the delta platform whereas in the early twentieth century it was a common species throughout the area (Montori *et al.* 2009).

France. In France, the species can be found nationwide, but is occasionally rare and often very localised (Hervé 2004). In the French continental biogeographical region, the species is relatively rare and localized, except in the Massif Central. On a smaller scale, there has been no notable decline in the different administrative regions, but the species is currently endangered (except for the Massif Central populations). In the Atlantic area, the species is common (except in Les Landes) but generally declining (only well documented in the Nord-Pas-de-Calais region). Despite the recorded declines, it would appear that there is still little or no threat to the long-

term survival of the species. In the Alpine area, the species is common in the Pyrenees whereas it is highly localized in the Alps. Threats remain undetermined due to the lack of information. However, high mortality caused by *chytrid* fungus was recently reported from the French and Spanish Pyrenees. Finally, in the Mediterranean area, the species is common or very common, with stable populations approximately since the 1970s (Crochet *et al.* 2004).

Luxembourg. The midwife toad was described as a relatively common species in Luxembourg, particularly widespread in areas with sandstone soils (Proess 2003). In the southern parts of the country, where heavy soils predominate, *Alytes obstetricans* has not been detected (Proess 2003). During recent surveys (2007-2009), the species was not detected at several sites where it had previously been recorded (Wood, *unpublished data*). Coupled with the recent discovery of amphibian *chytridiomycosis* at some *Alytes* sites in Luxembourg (Wood *et al.* 2009), this new information may indicate that the species may well be declining.

Belgium. The populations in the south of the country (Wallonia) are not threatened. Nevertheless, populations along the northern boundary and north-east of this area are more localized and in decline. The reasons for this are not clear, although loss of habitat is one cause. The midwife toad is in danger of extinction in the Flemish region, and is classed as "Least Concern" in the Wallonian region. In central Belgium it has become a rare and localized species (Jacob *et al.* 2007).

Netherlands. The midwife toad only occurs naturally in the south of the province of Limburg (RAVON 2008), but has been introduced in some more northerly areas (Bosman *pers. comm.*). In the Netherlands, research has shown that the populations of midwife toad have decreased in recent decades. Until 40 years ago, the midwife toad was still fairly common in southern Limburg province. In 1997, 14 sites with viable populations of the species were found. The extinction of two populations was confirmed by monitoring in 2001. The size of populations has declined dramatically. In some locations, there are currently populations of only a few dozen individuals, whereas in the past they contained hundreds or even thousands. Populations of only a few dozen toads are certainly too small to ensure long-term survival of this species (Crombaghs & Bosman 2006).

Germany. In Germany, the species is restricted to the central and western regions (Günther & Scheidt 1996). The country represents the northern and eastern distribution limits for the species. There are still some small populations in the land Baden-Württemberg, in gravel pits in the Upper Rhine valley and in quarries and small waters (mainly old fire water ponds on farms) in the Black Forest (Sowrig 2003). Species is still present in many parts of Rhineland-Palatine (Eislöffel 2003). Revising most recent literature on this species in Germany, it can be said that *Alytes* populations in Germany are small, isolated and declining due mainly to habitat loss and fragmentation (Grossenbacher & Zumbach 2003). In all provinces where it has been recorded, marked population declines as well as local extinctions have been observed in recent years (in Lower Saxony up to 60%), mainly because of habitat destruction. Nowadays, populations of more than 100 calling males are very rare (Günther & Scheidt 1996).

Switzerland. The Swiss populations of midwife toads live in the Jura region, the lowlands and on hilly land in the Pre-Alps, up to 1600m in altitude. About 660 local populations are actually known (amongst 12,000 mapped amphibian breeding sites; Schmidt & Zumbach 2005). The species is only present in the north of the Alps and in the northern and western parts of the country, which represent its south-eastern distribution limit (Meyer *et al*. 2009).

United Kingdom. The midwife toad was introduced into a garden in Bedford (85 km North of London) at the end of the nineteenth century, where it thrived and expanded in the area. Further populations were introduced in Yorkshire, Worksop and South Devon. In addition, some populations have arisen from escapees from captivity. The current status of most of these populations is now unclear, but it is safe to say that a number remain in the wild. Fortunately, they do not appear to represent a threat to the native wildlife through competition and/or predation (HCT 2009).

Population trends

In accordance with the EU Conservation Status Assessment (Habitats Directive-Art 17 Report), the population trends for the period 2001-2006 are summarized as follows (see also Table 1):

- Populations are stable in Belgium, Netherlands, Luxembourg and in the Mediterranean biogeographical region of France.
- Populations are declining in Germany and the rest of the biogeographical regions of France (Alpine, Atlantic and Continental).
- For Spain and Portugal, population trends are 'Not Assessed' and 'Unknown', respectively.

In Switzerland, the number of midwife toads has significantly declined in recent years, mainly in the lowlands. Also, most of the populations are small (records of more than 20 calling males are rather rare) (Borgula & Zumbach 2003, Schmidt & Zumbach 2005).

Table 1. *Alytes obstetricans* population and trends according to the reports submitted by the EU Member States under Article 17 of the Habitats Directive (for 2001-2006).

Member State	Population size	Date of estimation	Data quality[1]	Population trend[2]	Period for estimation of pop. trend
PT	100.000 indiv.	2005	M	Unknown	N/A
ES	1.486 loc.	2006	M (ATL)	N/A	2000-2006 (ALP); 1995-2007 (ATL)
FR	2.816 – 6.952 x	2001-2006	M	ALP,ATL,CON: - MED:=	N/A
LU	72 loc.	1997-2006	G	=	2001-2006
BE	763 grids	2000-2006	G	=	1970-2006
NL	900 – 5.000 indiv.	1999-2005	G	=	1999-2005
DE	809 x	1990-2006	G	-	1991-2006

[1] Data quality: G - good, M – moderate.
[2] Population trend: + increasing, = stable, - decreasing, N/A – not assessed.
Source: Based on EC Habitats Directive - Article 17 Report 2001-2006 period, *Alytes obstetricans* summary factsheet. July 2009.
Note: For France and Germany, the unit used to estimate the species population size (x) was missing or not in line with the reporting requirements (EEA 2009).

Table 1 shows different approaches used in reporting population size and trend for *Alytes obstetricans*. Even if Member States where encouraged to report data collected during the reported period (2001-2006), they have mostly used data collected for other purposes (often related to national data requirements, including site management) and over varying time

periods. In other cases, there are no data. As the table above shows, Member States reported population size with various units and scales. For example, Portugal reported number of individuals; Luxembourg reported locations, and France reported an interval of minimum and maximum 10x10km square of the species distribution range (Souan 2007). These differences in reporting populations may have led to under- or overestimating of populations of this species at the European level. There is thus a clear need to harmonise or ensure compatibility of data among countries hosting the midwife toad in order to better assess its conservation status.

1.4 Threats

General habitat loss (including loss of breeding sites) has been the main cause of the decline of *Alytes obstetricans* in many areas. As a consequence, fragmentation of metapopulations[4] might be a serious problem for the species in several parts of its distribution range. Moreover, it seems that greater declines of populations are occurring at the edges of the European distribution range. Additional mortality due to disease, predation and/or competition from alien species are also major threats. The main threats reported in a recent assessment of midwife toad conservation status conducted by the EU Member States (under the Habitats Directive – Article 17 Report) are summarized in Annex 1 of this document.

Loss, fragmentation and degradation of habitats

Loss of terrestrial habitat used for shelter, refuge, foraging and mating

Suitable areas used by *A. obstetricans* for shelter, refuge, foraging and mating may be lost or degraded where landscape features such as hedgerows, field margins and stonewalls are removed. Common in agricultural areas, these features can also be found in other distribution areas of *A. obstetricans* (small villages, natural parks, etc.). There are several causes depending on region and country, but most are related to changes in agricultural practices.

Removal of field margins, hedgerows, stonewalls, stone piles, wood piles and old structures with cavities that provide hiding places for *A. obstetricans* usually occurs in areas where intensification of agricultural practices requires fields to be enlarged, e.g. in reallotment or land consolidation processes. This practice, which may lead to direct loss of midwife toad habitat, has been and still is a very important threat in the Netherlands (Bosman *pers. comm.*), Switzerland (Schmidt *pers. comm.*) and, more recently, in northern Spain (Ayres *pers. comm.*).

Other agricultural changes, such as the transformation of pastures or meadows to intensive arable land (Schmidt *pers. comm.*), eliminate landscape features that provide suitable habitat for *A. obstetricans*. This seems to be one of the most important reasons for its decline in Germany in recent decades (Uthleb *et al.* 2003, Günther et al 2005). Moreover, reduction or abandonment of cultivated land causes an increase in shrubland and forest which is detrimental to the establishment of heliophilous species such as the common midwife toad. Also, the spruces *(Picea* spp.*)* cultivated in eastern France (Lorraine region) can have a similar impact on isolated populations of common midwife toad (Duguet *pers. comm.*).

[4] Metapopulation: in ecology, a regional group of connected populations of a species (Encyclopædia Britannica Online 2010).

Moreover, changing traditionally cultivated fields and crops for highly intensive crops, such as corn, e.g. in the Netherlands, has been reported to have a negative impact on midwife toads. Indeed, this type of farming does not allow invertebrates to develop, thus impacting on foraging amphibians. Intensive use of agrochemicals, not only on corn fields, affects midwife toads as pesticides can eliminate the invertebrates that are part of their diet. Herbicides can eliminate the vegetation that are the habitat of both *A. obstetricans* or its prey species.

Thus, changes in agricultural land uses are probably one of the most important reasons for midwife toad decline in Central Europe since the last century. In the future, a similar trend can be expected in the southern parts of its distribution range.

Finally, fires can cause the loss of most of the midwife toad's trophic and spatial resources. At a more local scale, burning of bushes, hedgerows and riparian vegetation causes severe loss of available habitat structures and food resources.

Loss of breeding sites

The long larval development of *A. obstetricans* requires permanent water points, where tadpoles can hibernate depending on altitude, region and date of spawning. The causes of the degradation or destruction of such habitat are summarized below.

In many areas previously occupied by the midwife toad, wetlands were and are drained to increase the amount of arable land as a consequence of agricultural intensification. This caused the desiccation of breeding sites. Furthermore, ponds used for irrigation or to water livestock are lost or lack appropriate management as a consequence of current abandonment of traditional agricultural practices, leading to the loss of breeding sites for *A. obstetricans*. In most parts of Central Europe, both agricultural water sources and former industrial and handicraft water sources have been lost. In Switzerland and south-western Germany, the destruction of and changes in the use of ponds originally built near farmhouses for fire fighting also lead to a loss of breeding sites (Schmidt *pers. comm.* Günther et al. 2005). In many areas, 50-90% of available water points for breeding have been lost in recent decades (Uthleb *pers. comm.*).

Another reason why the ponds used by tadpoles are drying up is the intensive groundwater pumping for crop irrigation, drinking water, industry, etc. For example, in the Netherlands the development of mechanical drinking systems was an important threat in the past and one of the main causes of loss of breeding sites for *A. obstetricans*. Nowadays, drainage of entire landscapes is a very important threat in this country. Through measures taken in the last 10 years to make more land suitable for agriculture, retention basins have been built to collect water after heavy rainfall. They may appear to be potential breeding sites for *A. obstetricans,* but in fact they are not because most are not permanently flooded (Bosman *pers. comm.*).

Besides drainage for agricultural purposes, lowering the groundwater level by pumping, river canalization or dams, which reduces the groundwater peak after snow melt in the Alps during the breeding season, are also major causes of desiccation of ponds and landscape in Switzerland.

In areas at risk of fire, a temporary loss of water points may occur if artificial ponds are completely emptied for fire fighting. This is most likely when the fire risk is high, e.g. in summer. This can have two negative effects for the midwife toad: firstly, tadpoles in the ponds die, and, secondly, the pond is temporarily lost as a breeding site.

Furthermore, a multitude of other factors, such as intensive deforestation, erosion and sedimentation, prolonged drought, etc., lead to the disappearance of surface water. For example, in Spain the desertification process has accelerated in recent decades, causing the disappearance of a large number of small water bodies once used as breeding sites by several species of amphibians (Márquez & Lizana 2002).

In southern countries, such as Portugal and Spain, the monoculture of tree species (especially *Eucalyptus*) in some regions was reported to cause the depletion of aquifers. This can negatively impact hydrology, also leading to a reduction in groundwater quantity/availability and eventually to desiccation of the ponds fed by groundwater and, therefore, the loss of *A. obstetricans* breeding habitat. This type of intensive forestry also causes degradation of terrestrial habitat, reduction of invertebrate availability, etc.

In Central Europe, the intensification, rehabilitation or an unsuitable management of pits and quarries providing secondary, man-made habitats for *A. obstetricans* has also been reported as an important threat (Schmidt *pers. comm.*, Kordges 2003, Borgula & Zumbach 2003).

Contamination of ponds and streams by diffuse pollution from agrochemicals is considered a potential impact for amphibians (Márquez & Lizana 2002) although there is no scientific evidence about the negative effects on the midwife toad. To counteract this threat, new breeding ponds have been built in the Netherlands over the last 20 years, with locations being carefully chosen to avoid this type of pollution (Bosman *pers. comm.*).

Finally, intensive livestock grazing can also pose a threat to the midwife toad in some regions. High cattle density can cause ponds to fill up with sediment (aggradation). Trampling by cattle can also have a negative impact, breaking the clay sediment layers that maintain a pond's impermeability, possibly leading to desiccation and the death of the tadpoles.

Habitat fragmentation

The loss of *A. obstetricans* habitat (shelter or breeding habitat) can affect a midwife toad population in two ways. At the population level, separation of the resting place from the breeding site can threaten the survival of a small, very localized population. For example, in mountain rural areas, roads can cause this type of habitat fragmentation, with the refuge/shelter habitat on one side of the road and the breeding site on the other. Having to cross the roads means an increase in the risk of mortality.

Secondly, habitat fragmentation can also lead to the isolation of smaller populations with all the attendant negative consequences, e.g. loss of genetic diversity, higher probability of local extinction, difficulties for re-colonization of suitable habitats. In the case of the midwife toad, habitat fragmentation is mainly caused by infrastructures, urban development, loss of small ponds and intensive agriculture.

Species mortality and population decline

Disease

Until recently the only known disease that appeared to affect amphibians in natural conditions was "red leg", which is caused by the abnormal presence of the *Aeromonas hydrophyla*

bacterium. More recently, however, two other specific pathogens of amphibians have been discovered: chytridiomycosis and the iridoviruses, which are fatal (Bosch 2003).

Chytridiomycosis was first detected in Europe in 1997 in well conserved environments such as Peñalara Natural Park (Madrid Autonomous Region, Spain). Caused by the chytrid fungus *Batrachochytrium dendrobatidis,* it affects adults and tadpoles. Affected amphibian adults are killed more rapidly than tadpoles, which die once they have completed metamorphosis[5]. Another characteristic of the fungus is that once it has appeared in an area, it can remain in the environment as a saprophyte even if amphibians are no longer present.

Some amphibian populations in Peñalara Natural Park (Spain) have been affected by *chytridiomycosis,* leading to their decline and virtual disappearance. Not all amphibian species have been equally affected. Only 3 out of 10 have suffered significant decline, the common midwife toad being the worst affected (Bosch 2003). Indeed, *A. obstetricans* seems to be the species that is most sensitive to *chytridiomycosis* in Europe (Bosch *et al.* 2001, Bosch *pers. comm.*). Although in affected populations some individuals may survive this disease, it seems unlikely that infected populations will recover naturally (Bosch & Fernández-Beaskoetxea 2008) due to the high mortality involved.

There are cases of amphibian mass mortalities in other Spanish regions, most of them in high mountain areas where cool temperatures facilitate the growth of the chytrid fungus[6]. Indeed, a recent study suggests that all midwife toad populations at over 1.500 m are at high risk of decline from this cause (Walker *et al.* 2010). A recent study on midwife toads at 126 locations on the Iberian Peninsula found that 25% of the populations studied were infected with chytrid fungus. In Spain, mass die-offs are occurring in the Sierra de Guadarrama, the Cantabrian Mountains and the Pyrenees (Walker *et al.* 2010).

The chytrid fungus is also widespread in Switzerland, where it was detected in about two thirds of the surveyed ponds (n ≈ 130), where *chytridiomycosis*-induced mortality at metamorphosis can on occasions be very high (Tobler & Schmidt, *unpublished data*). The fungus is also likely to be present in the Netherlands and Belgium (Bosman *pers. comm.*), and was recently detected in Luxembourg (Wood *et al.* 2009), France (Duguet *pers. comm.)* and Germany (Böll *pers. comm.*, Kronshage *et al. in prep*.). There has been a noteworthy sudden and recent decline in some large midwife toad populations living in quarries in western Germany (North Rhine-Westphalia region), where their habitats are well conserved. *Chytridiomycosis* was suspected as the reason for the decline. Recent studies support this hypothesis, suggesting that most of the populations studied proved to be infected (S. Lötters *pers. comm.*).

In Peñalara Natural Park, a recent study has also described an indirect effect of *chytridiomycosis*, leading to increased interspecific competition with *Bufo bufo*, which is less severely affected by *chytridiomycosis* and thus occupies ponds formerly used by *A. obstetricans* as breeding sites (Bosch & Rincón 2008).

Research is currently being carried out in Spain and Switzerland on the use of antifungals, such as *Itraconazole,* to combat *chytridiomycosis* in *A. obstetricans* (Bosch *pers. comm.*; Schmidt *pers. comm*).

[5] Source: www.sosanfibios.org
[6] Source: www.sosanfibios.org

All this indicates that unless *chytridiomycosis* has not the same impact in all the populations it is very important to provide measures against this disease in all the distribution areas.

Unlike chytridiomycosis, iridoviruses appear mainly in degraded environments, where large numbers of amphibians are concentrated in a few water ponds to breed (Bosch 2003). These pathogens are extremely resilient and very easily transmitted. Mortality caused by iridoviruses has been identified in Peneda-Geres National Park (north-western Portugal) and in the Cantabrian Mountains and the Pyrenees, in Spain (Márquez *et al.* 1995). At the latter location, declines in *A. obstetricans* populations caused by the virus have been detected (Bosch *pers. comm*.).

More recently, a ranavirus[7] that causes high mortality in tadpoles of the common midwife toad, provisionally designated as the common midwife toad virus (CMTV), has been described for northern Spain (Balseiro *et al.* 2009). According to Bosch *et al.* (*unpublished data*) this virus is not specific to *A. obstetricans* since it affects at least four species and is even more virulent in some of them. This new pathogen is more widespread than expected, being currently found in the Cantabrian Mountains (northern Spain) and also in the Pyrenees (Bosch *et al.*, *unpublished data*).

Introduction of species

The introduction of species (autochthonous and/or exotic) into *A. obstetricans* habitat can cause several alterations in the dynamics of communities primarily through predation, competition, resource depletion and habitat modification. In this context, fish, crayfish and turtles are the most detrimental species for the midwife toad, causing direct mortality by predation of tadpoles. Indeed, predation by native fish introduced into naturally fish-free water bodies has been reported as a serious threat for the midwife toad in Spain (Bosch 2009), Switzerland (Schmidt *pers. comm.*, Schmidt & Zumbach 2005), France (Duguet & Bentata *pers. comm.*) and Germany (Böll *et al.* 2010, Kordges 2003).

The same effect is caused by exotic aquatic species introduced into *A. obstetricans* breeding sites. In Peneda-Geres National Park (north-western Portugal) for example, an introduced North American predatory fish - *Lepomis gibbosus*- is causing direct mortality of midwife toads by predation (Bosch *et al.* 2008). This may also occur with introduced salmonids in high mountains lakes. In Peñalara Natural Park (central Spain), the brook trout (*Salvelinus fontinalis*) was introduced in the 1970s at Laguna Grande lake, leading to the complete disappearance of the lake's midwife toad population. This fish species has also been introduced in the north and west (Sierra de Gredos) of Spain, leading to local extinctions of *A. obstetricans* populations. Moreover, in France and Andorra, introductions of native and exotic salmonid species into naturally fish-free mountain lakes also occur, even in natural protected areas such as Pyrenees National Park (south-western France) (Bosch *pers. comm.*).

In Spain, direct predation of tadpoles by the American crayfish (*Procambarus clarckii*) as well as competition has been observed at various sites (fountains, ponds and streams) where the latter has been introduced (Ayllón & Hernández 2009). Similarly, in Germany two further introduced crayfish species (*Orconectes limosus* and *Pacifastacus leniusculus*) represent a serious threat to larvae of *A. obstetricans* (Kordges 2003). Finally, the goldfish *Carassius*

[7] Ranavirus are a group of the Iridovirus family affecting amphibians.

auratus also has a negative impact on *A. obstetricans* in Switzerland (Schmidt *pers. comm.*) and France (Crochet *et al.* 2004).

Another case of negative impact of alien species on *A. obstetricans* may be that of new introduced pathogens and parasites. In Portugal, for example, iridovirus has been transferred to the midwife toad by the introduced fish *Lepomis gibbosus* at Carris Lake in Peneda-Geres National Park. Also, other alien amphibian species, such as the American bullfrog (*Rana catesbeiana*), are potential hosts of communicable diseases.

Other exotic alien species reported to be potentially detrimental to the midwife toad are *Trachemys scripta* and *Gambusia holbrooki*. The latter has been described as a conservation problem for *A. obstetricans* in north-western Spain (Galán 2008). The effects of introduced alien species are usually greater in aquatic environments than in terrestrial ones due to their isolation (Márquez & Lizana 2002).

Road mortality

Owing to short-distance migration between terrestrial and larval habitat, road kills are usually a local problem for the midwife toad (Uthleb *pers. comm.*). However, depending on the location, road type, traffic and season, countryside roads may represent a threat. A study on vertebrate road kills carried out in Spain in 1990-91 found that amphibians represented around 25% of the vertebrates killed by traffic, but *Alytes obstetricans* represented only 2-3% of the total amphibian road kills (PMVC-CODA 1993). Nevertheless, in some specific locations, such as Garraf Natural Park (Catalonia, Spain), up to 10% of amphibians killed by vehicles were *A. obstetricans* (Montori *et al*. 2003). In this regard, a recent review of amphibian road mortality prevention suggests that, for *Alytes obstetricans*, it may be possible to reduce road mortality by providing suitable terrestrial habitat next to existing breeding sites. This method may be beneficial for a midwife toad population simply because a larger proportion of the population uses terrestrial habitat that is not isolated by a road from the breeding site (Schmidt & Zumbach 2008).

Pollution by agrochemicals

Among the different types of pollutants, agrochemicals are likely to have the most detrimental effect on *A. obstetricans*. Although there is no specific scientific evidence about the effects on the midwife toad, several studies confirm the negative impact of numerous insecticides on amphibians, either by direct ingestion through their prey or from water. The effects range from immediate death, hyperactivity, developmental dysfunction and malformations, reduction in fertility and a decline in resistance to disease. Other effects may reduce their ability to survive through behavioural alterations, delayed larval development, increased vulnerability to predation, etc. (Márquez & Lizana 2002). For example, glyphosate, a relatively common herbicide used in forestry management, is highly toxic to many amphibian species (Relyea 2005; Relyea & Jones 2009).

Table 2. Current threats to *Alytes obstetricans* in its distribution range (*).

THREATS				PT	ES	FR	LU	NL	DE	CH
HABITAT LOSS / FRAGMENTATION	Agricultural practices, Forestry	Intensification	Pesticides	++	++	+			?	
			Fertilizers	+	++			++	?	++
			Land consolidation	++	+	++	+	+		+
		Changes in crops		+	+	P		+		
		Changes in agricultural practices		++	++	++	++		++	+
		Abandonment of agriculture		+	+				++	
		Removal of small landscape elements (stonewalls, walls, brooks, etc).		++	++	++	+	+++	+++	+++
		Monoculture of exotic trees		++						
		Reforestation				++			+	
		Pond loss and desiccation	Trampling by cattle	+	+					-
			Destruction, elimination	+++	+++	+++	+		+++	+
			Bad/Lack of management/use	+++	+++	+++	++		+++	++
			Groundwater pumping	+	++	++			+	
			Drainage	++	++	++	+	+++	+	++
			Forest plantations	+	+	+			+	
	Built infrastructures and industrial activities	Urban infrastructures	Housing	++	-	+++	+	+	+	+
			Industrial	+	-	+	++	+		+
		Transport	Roads	+	+	+		+	+	+
			Transport stations	+	-	+				+
		Extractive activities	Quarry exploitations (intensification and/or closure) without specific provisions	?	?	+++	+++		+++	+++
POPULATION DECLINE / MORTALITY	Road kills			+	+	?			+	-
	Pollution	Domestic		+	-	?	+			
		Industrial		+	-	?	++			
		Agricultural (agrochemicals)		++	+	++	+	+	+	?
	Introduced species	Native	Fish	+	+++	++	+	+	+++	++
		Exotic	Fish	++	+++	++	+		+	++
			Crayfish	+++	++	++			?	?
	Diseases	Chytridiomycosis		?	+++	+	P	+	+	++
		Iridovirus/ranavirus		?	++				P	?

Threat intensity:

+++ = critical ++ = very important + = important ? = unknown P=Probable - = no information

(*) It was not possible to obtain this information for Belgium.

1.5 Effects of climate change that could affect the midwife toad

Evidence of a link between amphibian declines and climate change is growing. Changes in temperature or precipitation influence the desiccation of landscapes, host-pathogen interactions as well as short-term and seasonal patterns in amphibian behaviour. One possible consequence might be an increase in the probability of outbreaks of lethal diseases such as *chytridiomycosis*. Research is needed to understand how climate change affects amphibians. In particular, studies should focus on the impacts of climate change on disease dynamics, and should develop predictive models for future declines, thus enabling implementation of conservation measures. Long-term observations on amphibian population dynamics in Peñalara Natural Park (Spain) were used to investigate the link between climate change and *chytridiomycosis*. The analysis showed a significant association between change in local climatic variables and the occurrence of *chytridiomycosis* there. According to this study, rising temperature is linked to the occurrence of chytrid-related disease. Given that *Batrachochytrium dendrobatidis* is known to be broadly distributed across Europe, there is now an urgent need to assess the generality of this finding and determine whether climate-driven epidemics may be expected to impact on amphibian species across the wider region (Bosch *et al.* 2007).

Climate change might also lead to a climate that is more favourable to the midwife toad, at least in the more north-westerly parts of its distribution range (Schmidt *pers. comm.*, Böll *et al.* 2010), but this is likely to depend on the availability of water (Araújo *et al*. 2006). Whereas in the Mediterranean and more easterly parts of its distribution range, global warming may increase the seasonality of water bodies, which will affect the development of *A. obstetricans* tadpoles (Bosch *pers. comm.*). In this regard, a study on climate warming and the decline of amphibians in Europe suggests that the loss of suitable climate space for amphibian species is forecast mainly for the south-west of Europe, including the Iberian Peninsula, whilst species in the south-east are projected to gain suitable climate. This is because dry conditions in the south-west are forecast to increase, approaching the levels found in North Africa, where few amphibian species are able to survive (Araújo *et al.* 2006). A recent report on the impact of climate change on Spanish wildlife species, predicts severe shrinkage in the potential distribution of Alytes obstetricans in the Iberian Peninsula throughout the 21st century (Araújo et al. 2011)

The risk for Alytes populations to be affected from climate change in Germany results from the species status, rather than from its ecological sensitivity which is not high. It is uncertain if climate change has a positive influence on the dispersal of diseases caused by fungi (e. g. chytridiomycosis). In the future competition with alien species from warmer regions could be a new threat for our autochthonous amphibian populations (Rabitsch et al 2010)).

Beyond research, conservation actions in relation to climate change and amphibian declines need to (from Gascon *et al.* 2007):

- Support initiatives that increase community resilience and reduce sensitivity to climate change (habitat restoration, corridors, etc.).
- Increase public awareness about the effects of climate change: create educational/outreach/research centres, web sites, positions in existing institutions.
- Promote changes in energy policy. Amphibian declines are critical in defining “dangerous human interference” in the climate system.

Research should also explore how ecosystems could be made more resilient to climate change (e.g. measures to restore movement corridors to maintain metapopulation functions or allow migration to new habitats), and whether there might be ways to manage the local "micro-scale" climate.

2. Species conservation and legal status across its geographic range

2.1 International conservation status and protection

In view of its wide distribution, tolerance of a broad range of habitats, presumed large population, and because it is unlikely to be declining fast enough to qualify for listing in a more threatened category, the midwife toad is classed as "Least Concern" (LC) by the *IUCN Red List* (Bosch *et al.* 2008). It is also considered a Least Concern-species on the *European Red List of Amphibians* (Temple & Cox 2009).

In the latest report under Article 17 of the Habitats Directive[8], the midwife toad was assessed as follows. The species status is 'unfavourable-bad' for the Alpine, Atlantic and Continental biogeographical regions and 'unknown but not favourable' in the Mediterranean biogeographical region. However, its status is reported as 'favourable' in Belgium and Luxembourg and good future prospects are reported by Portugal. For more detailed results of this assessment for the midwife toad, please consult Annex 2.

Concerning its protection, the midwife toad in listed in Annex IV of the EU Habitats Directive (92/43/EEC). It is also included in Appendix II of the Bern Convention[9].

2.2 National and regional conservation and legal status

Conservation status

The conservation status of the midwife toad in the different Member States of its distribution range has been assessed and the species is currently included on the national Red List for all the countries, being listed as "Near threatened" (Spain), "Least Concern" (Portugal, France, Belgium), "Vulnerable" (Netherlands and Germany) and "Endangered" (Switzerland). In Luxembourg, the species is currently not endangered. Moreover, in some countries, the species has also been included on regional Red Lists, with categories going from "Data deficient" (Murcia region, Spain), "Endangered" (Alsace, France and Flanders, Belgium; four regions in Germany) or even "Critically endangered" (Bavaria, Germany). More detailed information on national and regional conservation status is included in Annex 3.

Legal status

In some of the EU Member States where *Alytes obstetricans* occurs, the species is protected under national and/or regional regulations. This is the case of Spain, Belgium, the Netherlands,

[8] More information available at:
http://ec.europa.eu/environment/nature/knowledge/rep_habitats/index_en.htm
http://biodiversity.eionet.europa.eu/article17

[9] Convention on the Conservation of European Wildlife and Natural Habitats. Bern, Switzerland, 9.9.1979. Available at: http://conventions.coe.int/Treaty/EN/Treaties/Html/104.htm

Germany and Switzerland. Besides, the toad's habitat is protected in some countries such as France and Luxembourg, where the destruction or degradation of ponds used as breeding sites or any other site used by amphibians is banned. In Luxembourg, a share of the costs to protect some species, including *A. obstetricans,* is reimbursed by the State. More detailed information on the national and regional regulations concerning the midwife toad is included in Annex 4.

2.3 Existing and recent conservation actions

Several conservation measures targeting *A. obstetricans* have been carried out or are currently ongoing in different European countries. Specific conservation/action plans are being implemented in, for example, Limburg province in the Netherlands; Bavaria in Germany, and Lucerne and Zurich cantons in Switzerland.

In addition, numerous projects aim to conserve midwife toad habitats. Conservation actions, such as creation and/or restoration of breeding ponds, maintenance of open areas with hiding places, and creation of reserves for amphibians, were (or are being) implemented in Spain, France, Belgium and the Netherlands. In Germany several projects have been carried out, as: Target species concept in Baden-Württemberg, Creation of breeding ponds in Rinteln (Lower Saxony), and Biotope management, breeding and reintroduction in North Rhine-Westphalia.

In Spain, a captive breeding centre for endangered amphibians (including *A. obstetricans*) opened in 2008. The same year a monitoring programme was launched by the Ministry of Environment with the aim of acquiring population data on long-term population trends in Spain's amphibians and reptiles. Furthermore, the project RACE – *Risk Assessment of Chytridiomycosis to European amphibian biodiversity* carried out by researchers from Spain, Germany, France, United Kingdom and Switzerland got underway in 2009 to assess *chytridiomycosis* in Europe in order to suggest guidelines for a Europe-wide policy on conservation actions.

Annex 5 of this document includes more details on these projects as well as on some regional action plans for the species.

2.4 Conservation priorities for the midwife toad

Conservation priorities can be identified taking into account the main ecological requirements of the midwife toad:

- Permanent water points without fish should be maintained in suitable areas to enable the species to accomplish its long period of larval development.
- Suitable terrestrial habitat that is used throughout the year should be maintained in the direct vicinity of the aquatic habitat.
- Efforts should be made to control emerging diseases, especially with respect to populations in mountain areas, which are particularly vulnerable to them.

2.5 Gaps in knowledge

Alytes obstetricans is relatively well known to scientists and researchers. Currently a great deal of scientific work is being conducted on its biology and ecology, which furthers understanding of its specific requirements. Nevertheless, there is a need for more information on its current

distribution and populations in some areas of its distribution range, as well as on the emerging diseases that can affect it.

In order to fill these gaps in knowledge, the following priority areas for further research are recommended:

Mapping and monitoring:

- detailed mapping of distribution and conservation status of midwife toad populations in Portugal and France.
- harmonisation of survey and mapping techniques and/or implementation/drafting of standardised methods where possible (for an example, see Schmidt 2005) in order to produce comparable data on *A. obstetricans* distribution and populations across Europe.

Emerging diseases:

- dispersal mechanisms of the chytrid fungus.
- long-term effects of diseases on midwife toad (and other amphibian) populations.
- best instruments and techniques to combat disease.

Introduced species:

- draw up a distribution map of alien species in Europe.
- effects and impacts of introduced and/or alien species on *A. obstetricans*.
- best instruments and techniques to reduce or eliminate introduced species.

Habitat fragmentation:

- effects of habitat fragmentation on the population dynamics of *A. obstetricans*.
- significance of habitat connectivity for the survival of midwife toad (meta-) populations.

Agrochemicals:

- effects of agrochemicals on midwife toad populations.

Some of these subjects have been integrated into the framework for action of this action plan and are included in the corresponding actions.

3. Framework for action

3.1 Goal

The overall goal of this European Species Action Plan is to improve the conservation status of the midwife toad, *Alytes obstetricans*, in the European Union in order to achieve a favourable status.

3.2 Objectives

To achieve this goal, the identified threats to midwife toad populations and their habitats need to be overcome. The following objectives are integral to this process:

Objective 1: To maintain a coherent structure of meta-populations of *A. obstetricans* in order to develop long-term viable populations throughout the species distribution range.

Objective 2: To control the main threats affecting the species, especially mortality caused by emerging diseases and predation of tadpoles by introduced species. Namely to control the negative effects and spread of *chytridiomycosis* in mountain areas where the species is present and threatened by this disease.

Objective 3: To control the main threats affecting midwife toad habitats, especially the loss of field margins, stonewalls and similar elements of agricultural landscapes, as well as the loss and degradation of ponds and other breeding sites.

3.3 Actions

In order to achieve the objectives set out above, a list of recommendations for actions has been established taking into account that the situation of and threats to the midwife toad in each Member State require different priorities and time scales for implementation. In the table below the actions are divided into six categories as follows:

- Habitat management and improvement
- Combating habitat fragmentation
- Reducing species mortality and recovering populations
- Scientific research
- Coordinating Action Plan implementation
- Public awareness, education and information

Table 3. Actions

nº	ACTIONS	MS	Priority in each MS[10]	Time scale[11]	Responsible organisation (s)
Habitat management and improvement					
1	Mapping key areas and distribution of the species in areas where this information is missing.	All MS	High Essential: DE	Permanent	Research institutions, conservation agencies, NGOs
2	Developing and implementing monitoring actions for the species in areas where this information is missing.	All MS	High Essential: DE	Permanent	Competent conservation agency/administration.
3	Maintaining and restoring (where appropriate) semi-natural field margins, hedgerows, stonewalls, creeks and other agricultural landscape elements used as refuge, shelter and/or foraging habitat by *A. obstetricans* in important areas identified for the species. Recurrent management should be done periodically.	All MS	Essential	Permanent	Conservation agencies, site managers, land owners.
4	Preservation, restoration and/or appropriate management of existing breeding ponds.	All MS	Essential	Permanent	Conservation agencies, site managers, land owners.
5	Creation of new ponds close to suitable terrestrial habitats.	PT, ES, FR, LU, NL, DE, CH*	Essential: DE, CH* High: PT, LU, NL, ES Medium: FR	Long-term	Competent conservation agency/administration, site managers, land owners.
6	Consider the species habitat requirements in gravel and clay pits and quarries by implementing agreements or by imposing environmental conditions linked to the concession for exploitation. Agreements or conditions should contain specific provisions concerning the management of the aquatic and terrestrial habitat of the midwife toad, as well as a	DE, ES, FR, NL, LU, PT, CH*	Essential: CH* High: DE, ES, FR, NL, LU Medium: PT	Short term	Competent environmental authority, regional/local administration.

[10] Priority: Essential, High, Medium, Low.

[11] Time scale: Immediate: action should be completed in 1 year; Short: action completed in 3 years; Medium: completed in 5 years; Long: completed in 10 years; Ongoing: currently being implemented and should continue, Permanent: need to be repeated, e.g. monitoring.

CH*: Even if Switzerland is not a EU Member State, its species national experts have recommended actions to help improve the species situation in the country.

nº	ACTIONS	MS	Priority in each MS[10]	Time scale[11]	Responsible organisation (s)
	minimal quality and quantity of habitats which have to be guaranteed during the whole exploitation period in order to achieve viable populations in the locality.				
7	Implementing agreements regarding land management with forestry exploitations in important areas for the species. These agreements should contain specific provisions to maintain ponds, terrestrial habitat and a buffer zone around these elements, in order to achieve viable populations in the locality. These agreements could be incorporated into current regulations concerning new forestry plantations, in particular eucalyptus.	PT, ES	High	Medium term	Competent environmental authority, regional/local administration.
8	Preservation, restoration and/or appropriate management of ponds and other traditional watering points for cattle and irrigation that are used as breeding sites by the midwife toad, enabling adult toads and juveniles to get in and out.	PT, ES, LU, DE, FR, NL, CH*.	Essential: ES, PT. High: LU, DE, FR. Medium: NL. Low: in CH*.	Permanent	Competent environmental and/or agricultural authorities, conservation agencies, site managers.
9a 9b	- Adapting irrigation tanks (e.g. providing climbing slopes for adults; leaving a hole in the top of water tanks as access for toads, etc.) - Adapting pools used to fight forest fires by installing a compartment inside inaccessible to maintenance or which prevents pond from being completely emptied (a tap placed over the water lowest level, in order to always keep around 50cm of water). Another possibility is to place a filter/mesh inside the water tank which will prevent the tadpoles from escaping through the waste pipe.	PT, ES	Essential: ES High: PT	Medium term	Competent environmental and/or agricultural authorities, conservation agencies, site managers.
10	- Preserving and managing traditional ponds used for fire fighting.	DE, CH*	High	Short term and Permanent	Competent fire/environmental authority, site managers.
11	Ensuring implementation of compensation measures (including translocation) in case of destruction of ponds and terrestrial habitat.	All MS	Essential	Immediate (Ongoing: CH*)	Land owners, land users, local administration, environmental

nº	ACTIONS	MS	Priority in each MS[10]	Time scale[11]	Responsible organisation (s)
					authorities.
12	Preparation of guidelines for restoration, preservation and management of habitats (e.g. how to construct stonewalls suitable for *A. obstetricans*).	FR, LU, ES, DE, PT, CH*	Essential: FR, LU, ES. High: DE, PT, CH.	Immediate	Conservation agencies, competent environmental authority.
13	Promotion of environmentally friendly agricultural practices (such as the reduction of fertilizer input, returning to traditional agricultural practices, promotion of landscape heterogeneity, etc.) in important areas for the species.	FR, DE, NL, PT, CH*	Essential: FR, PT High: DE Low: NL, CH*	Short: DE, PT Ongoing: NL, CH*	Competent agricultural authorities.
14	Adapting retention basins to the requirements of *A. obstetricans.*	NL, DE, CH*	High: NL, CH* Low: DE	Medium: DE, CH* Long: NL	Competent environmental and/or water authority.
15	Creating buffer zones around *A. obstetricans* breeding points in order to protect them from (agro-) chemical pollution, siltation, etc. acting as physical and chemical filtration sites.	FR, ES, DE, PT, CH*	Medium: FR, PT High: CH*, DE Low: Es	Short: DE Medium: PT Long: FR, ES, CH*	Conservation agencies, competent environmental authority, site managers, land owners.
16	Promote the reduction of agrochemicals in highly intensive agricultural landscapes within the distribution range of the midwife toad in order to reduce diffuse pollution.	FR, ES, DE, PT, CH*	High: FR, PT, DE Medium: CH* Low: ES	Short: FR, DE Medium: CH* Long: PT Permanent: ES	Competent agricultural authorities.
Combat habitat fragmentation					
17	Increase connectivity between populations by creating new (linear) habitats (aquatic and terrestrial) close to existing populations, especially in areas with highly fragmented populations.	ES, DE, NL, PT, CH*	Essential: CH* High: DE, ES, NL Medium: PT	Immediate: ES Medium: NL, PT, CH* Long: DE Ongoing: NL	Conservation agencies, site managers.
18	Management and protection of large populations of midwife toad that could act as source populations.	NL, FR, ES, DE, PT, CH*	Essential: CH* High: NL, FR, ES, DE, PT	Immediate: ES Medium: FR, DE, PT	Conservation agencies, site managers.

nº	ACTIONS	MS	Priority in each MS[10]	Time scale[11]	Responsible organisation (s)
				Ongoing: NL Permanent: CH*	
19	Build ponds and shelter habitats for *A. obstetricans* on both sides of small roads in order to mitigate fragmentation and mortality due to road kills. This measure is intended to be an alternative to more expensive options aimed at avoiding amphibians crossing roads, thus avoiding road kill.	ES, DE, PT	Medium: ES Low: DE, PT	Immediate: ES Short: DE Medium: PT	Competent environmental authority, conservation agencies.
Reduction of species mortality and recovery of populations					
20	Remove introduced fish detrimental to *A. obstetricans* from naturally fish-free water points used as breeding sites (in particular in mountain lakes).	All MS	Essential High: PT	Medium term	Competent environmental authority, site managers, conservation agencies.
21	Prevent fish stocking fish at naturally fish-free water points.	All MS	High	Permanent	Competent environmental authority, site managers, conservation agencies.
22	Identify and apply appropriate measures to prevent the spread of emerging diseases	All	Essential	Immediate: PT Ongoing: NL, FR Permanent: DE, ES, CH*	Research institutions, conservation agencies, sites managers.
23a 23b	- In very specific, well studied cases, captive breeding and reintroduction of extinct populations. For reintroductions, adopt measures to prevent genetic contamination in areas with high intraspecific variability (Iberian Peninsula, for example) as well as the dispersal of pathogens (virus and fungi). - Draft a health protocol for amphibian reintroduction, including molecular analysis of the presence of pathogens and preventive treatment for fungi.	ES, PT, CH* DE, PT, CH*	Low: ES, CH* Medium: PT High: DE Essential: PT High: DE Medium: CH*	Medium: PT, DE Long: ES, CH* Immediate: DE, PT Short: CH*	Research institutions, conservation agencies.

nº	ACTIONS	MS	Priority in each MS[10]	Time scale[11]	Responsible organisation (s)
24	Adapting the construction of new roads (or other infrastructures) in specific areas within the species distribution range in order to avoid mortality due to road kill.	ES, PT	High: ES Low: PT	Immediate: ES Short: PT	National/regional authority responsible for infrastructure development.
Scientific research					
25	Promote research on how to remove introduced species detrimental to *A. obstetricans*. Publicise the results widely.	FR, ES, DE, NL, PT, CH*	Essential: ES, NL High: PT Medium: FR, CH* Low: DE	Immediate: NL Short: FR, CH* Medium: FR, PT, CH* Long: DE	National/regional research authority, conservation agencies, NGOs.
26	Promote research on the distribution of the chytrid fungus in Europe, the fungus' access route into the continent, its genetic composition and how it affects *A. obstetricans* populations (and other species).	FR, ES, DE, NL, PT, CH*	Essential: ES, FR, DE, NL, PT High: CH*	Immediate: NL Short: ES, FR, DE, PT Ongoing: CH*	European Commission, international conservation agencies, foundations, NGOs.
27	Promote research on mitigating the effects of chytridiomycosis on *A. obstetricans*.	FR, ES, DE, NL, PT, CH*	Essential: ES, FR, DE, NL, PT High: CH*	Immediate: NL Short: FR Medium: ES, PT Long: DE Ongoing: CH*	European Commission, conservation agencies, foundations, NGOs.
28	Promote research on the effects of climate change on midwife toad populations, possibilities of adaptation for the species, together with their early implementation etc.	ES, DE, NL, PT, CH*	Essential: NL High: ES, PT Medium: DE Low: CH*	Immediate: NL Medium: PT Long: ES, DE, CH*	European Commission, conservation agencies, foundations, NGOs.
	Coordination for the Action Plan implementation				
29	Establish a European *Alytes obstetricans* Working Group, consisting of experts from all countries in the species' distribution range. This group should be able to provide advice to Governments, authorities and relevant stakeholders, and also oversee the practical implementation of the conservation actions recommended in this plan.	All MS	High	Short to medium term	European Commission

nº	ACTIONS	MS	Priority in each MS[10]	Time scale[11]	Responsible organisation (s)
30	Distribute this Action Plan and promote its implementation among EU MS.	ES, DE, NL, PT, FR, CH*	Essential: ES, DE High: NL, FR, CH, PT	Immediate: NL, FR Medium: PT, DE, CH* Permanent: ES	European Commission, European *Alytes obstetricans* Working Group.
31	Identify all appropriate funding resources for the activities outlined in the Action Plan, ensuring that all relevant organisations, institutions and individuals are aware of such opportunities.	All MS	High	Short term	European Commission, European *Alytes obstetricans* Working Group.
Public awareness, education and information					
32	Implement awareness raising campaign targeted at various interest groups such as farmers, schools and inhabitants in rural areas, as well as the general public.	All MS	High	Long-term and permanent	Competent environmental authorities, conservation agencies.
33	Create a website containing relevant information on the species, its habitats, etc. as well as guidelines on management of habitats, good practice, protocols for scientists regarding handling amphibians, alien species, etc.	All MS	High	Long-term and permanent	European *Alytes obstetricans* Working Group.
34	Awareness raising campaign and capacity building for farmers to reduce agricultural inputs, especially in areas close to *A. obstetricans* breeding ponds and foraging habitat.	All MS	High	Long-term and permanent	Competent agricultural authorities.
35	Awareness raising campaign for forest fire-fighter bodies in order to try to find the best ways of preventing tadpole mortality during forest fires.	ES, PT	Medium: ES, PT	Immediate: PT Permanent: ES	National/regional Conservation agencies in collaboration with fire competent authorities.
36	Awareness raising campaign on the damage caused to the midwife toad by the introduction of species into their habitats.	All MS	Essential: ES High: PT Med: CH* Low: DE	Immediate: PT Medium: DE Long: FR Ongoing: NL Permanent: ES,	Environmental authorities, conservation agencies.

nº	ACTIONS	MS	Priority in each MS[10]	Time scale[11]	Responsible organisation (s)
				CH*	
37	Awareness raising campaign on amphibian emerging diseases and on *A. obstetricans'* vulnerability to them.	All MS	Essential	Permanent	European *Alytes obstetricans* Working Group.
38	Dissemination of information to public bodies, fishing associations and other groups on the damage that introduced species cause in midwife toad habitats.	FR, ES, DE, PT, CH*	Essential: ES High: FR, DE, PT, CH*	Immediate: PT Short: FR, CH* Medium: DE Permanent: ES, CH*	National environmental authorities.
39	Inform target actors on exotic species eradication	FR, ES, DE, PT, CH*	Essential: ES High: FR, DE, CH* Low: PT	Immediate: PT Long: FR, DE Permanent: ES, CH*	Research institutions, conservation agencies, NGOs.
40	Draft and publish a handling and ground equipment disinfection protocol for scientists working on water bodies and amphibian surveys in order to prevent the spread of disease.	FR, ES, DE, NL, PT, CH*	Essential: ES, PT High: FR, DE Medium: CH* Low: NL	Immediate: DE, PT Long: NL Ongoing: FR, CH Permanent: ES	Research institutions, European *Alytes obstetricans* Working Group.

3.4 Stakeholder participation

Stakeholders are people or groups who directly or indirectly affect the species positively or negatively, or are affected by it and its conservation. Stakeholder analysis involves assessing individuals and groups of individuals' relations with the species. The assessment is done by considering peoples' interest, their activities, how their activities impact on the species (positive or negative), the intensity of the impact and proposed actions (Sande *et al.* 2005). Thus, this Action Plan may only be successful if all the actors affected by the sound implementation of the proposed measures are consulted and involved.

Due to the wide distribution range of *Alytes obstetricans* and the variety of habitats it can occupy, different key stakeholders potentially affected or concerned with the implementation of each action should be identified on a case-by-case basis. Indeed, the success of this Action Plan may require the involvement of other sectors besides conservation agencies, such as agriculture, industry, forestry or transport.

An initial list of key stakeholders may include people in the following fields:

- Farming
- Fishing
- Quarrying
- Conservation (agencies and NGOs)
- Scientific research
- Local authorities
- Forestry (authorities and industries)
- Land ownership
- Inhabitants of rural areas

3.5 Monitoring and review

This Action Plan should be reviewed, at the latest, ten years after publication. Nevertheless, a continuous review of data on the species should allow for adjustments and adaptations in areas where the Plan is ineffective.

3.6 Other species that may benefit from the SAP

Conservation of *Alytes obstetricans* habitats may directly benefit other species sharing the same habitats. For example in north-western Spain, *A. obstetricans* shares habitat with the Bosca's newt (*Lissotriton boscai)*, the Iberian frog (*Rana iberica)*, the Iberian painted frog (*Discoglossus galganoi)*, the fire salamander (*Salamandra salamandra*) and the marbled newt (*Triturus marmoratus*). In Central Europe, amphibians like the great crested newt (*Triturus cristatus*), Alpine newt (*Ichthyosaura alpestris*) and palmate newt (*Lissotriton helveticus*) regularly share breeding habitat, as do the natterjack toad (*Bufo calamita*), yellow-bellied toad (*Bombina variegata*) and common tree frog (*Hyla arborea*). In addition, many other aquatic organisms like dragonflies and damselflies (Odonata), aquatic beetles and plants, etc. may benefit from the creation and maintenance of water bodies. Hence, whenever possible, synergies with other species conservation actions should be promoted, which will increase the action plan feasibility and its sucess.

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ANNEXES

Annex 1: Main threats for *Alytes obstetricans* reported by MS under Habitats Directive-Art. 17 Report (2001-2006)

Annex 2: EU Conservation Status Assessment – Habitats Directive-Art. 17 Report (2001-2006)

Annex 3: National and regional conservation status of *Alytes obstetricans* in EU Member States

Annex 4: National and regional regulations concerning *Alytes obstetricans* in EU Member States

Annex 5: Conservation measures and actions targeting *Alytes obstetricans* in Europe

ANNEX 1

Table A1. Main threats to *Alytes obstetricans* reported by Member States under Habitats Directive - Art.17 Report (for 2001-2006). Adapted from: EEA-ETC/BD Eionet 2009.

Code	Threats	PT		ES			FR				LU	BE		NL	DE	
		ATL	MED	ALP	ATL	MED	ATL	CON	ALP	MED	CON	ATL	CON	CON	ATL	CON
	Agriculture – Forestry															
100	Cultivation	x	x	x		x	x	x	x	x						x
101	Modification of cultivation practices						x	x	x	x						x
110	Use of pesticides				x	x	x	x	x	x			x			
120	Fertilisation						x	x	x	x			x			
141	Abandonment of pastoral systems			x	x		x	x	x	x						
150	Restructuring agricultural land holding					x	x	x	x	x				x		
151	Removal of hedges and copses						x	x	x	x						
160	General Forestry management						x	x	x	x		x				
161	Forest planting						x	x	x	x					x	x
167	Forest exploitation without replanting		x													
180	Burning									x						
190	Agriculture and forestry activities not referred to above			x	x											
	Fishing, hunting, collecting															
200	Fish and Shellfish Aquaculture						x	x	x	x			x			x
220	Leisure fishing						x	x	x	x						
290	Hunting, fishing or collecting activities not referred to above															x
	Mining and extraction of materials															
300	Sand and gravel extraction						x	x	x	x					x	x
301	Quarries						x	x	x	x						
330	Mines														x	x
	Urban and industrial areas/activities															
400	Urbanised areas, human habitation					x	x	x	x	x			x			x
401	Continuous urbanisation	x	x				x	x	x	x	x					
402	Discontinuous urbanisation						x	x	x	x						
410	Industrial or commercial areas						x	x	x	x			x			
412	Industrial stockage					x										
420	Discharges															x
421	Disposal of household waste						x	x	x	x						
423	Disposal of inert materials						x	x	x	x						
430	Agricultural structures			x		x										
	Transportation/communication															
500	Communication networks				x		x	x	x	x						
502	Roads, motorways	x	x			x	x	x	x	x	x				x	x
503	Railway lines, TGV						x	x	x	x						
505	Airport						x	x		x						
506	Aerodrome, heliport						x	x		x						
520	Shipping			x												

Code	Threats	PT		ES			FR				LU	BE		NL	DE	
		ATL	MED	ALP	ATL	MED	ATL	CON	ALP	MED	CON	ATL	CON	CON	ATL	CON
	Leisure/tourism															
600	Sport and leisure structures						x	x		x						
601	Golf course						x	x	x	x						
602	Skiing complex								x							
603	Stadium						x	x		x						
604	Circuit, track						x	x	x	x						
607	Sports pitch						x	x	x	x						
	Pollution															
700	Pollution						x	x	x	x						
701	Water pollution	x	x	x	x	x	x	x	x	x			x			x
703	Soil pollution						x	x	x	x						
790	Other pollution or human impacts/activities				x	x										
	Changes in hydrologic conditions															
800	Landfill, land reclamation and drying out, general			x	x	x	x	x	x	x		x				
803	Infilling of ditches, dykes, ponds, pools, marshes or pits	x	x			x	x	x	x	x			x	x	x	x
810	Drainage	x	x	x	x	x	x	x	x	x			x			
820	Removal of sediments (mud...)	x														
830	Canalisation			x		x	x	x	x	x						
840	Flooding						x	x	x	x						
850	Modification of hydrographic functioning, general				x		x	x	x	x						
852	Modifying structures of inland water courses			x		x							x			
853	Management of water levels			x		x										
890	Other human induced changes in hydraulic conditions			x	x	x										
	Natural processes															
910	Silting up						x	x	x	x						
920	Drying out		x				x	x	x	x			x			x
940	Natural catastrophes						x	x	x	x						
943	Collapse of terrain, landslide						x	x	x	x						
948	Fire (natural)		x				x	x	x	x						
950	Biocenotic evolution													x		
951	Drying out / accumulation of organic material													x		
953	Acidification				x		x	x	x	x						
954	Invasion by a species						x	x	x							
963	Introduction of disease			x	x	x	x	x	x	x						
965	Predation		x	x												
966	Antagonism arising from introduction of species				x	x							x			
990	Other natural processes										x					x

ANNEX 2

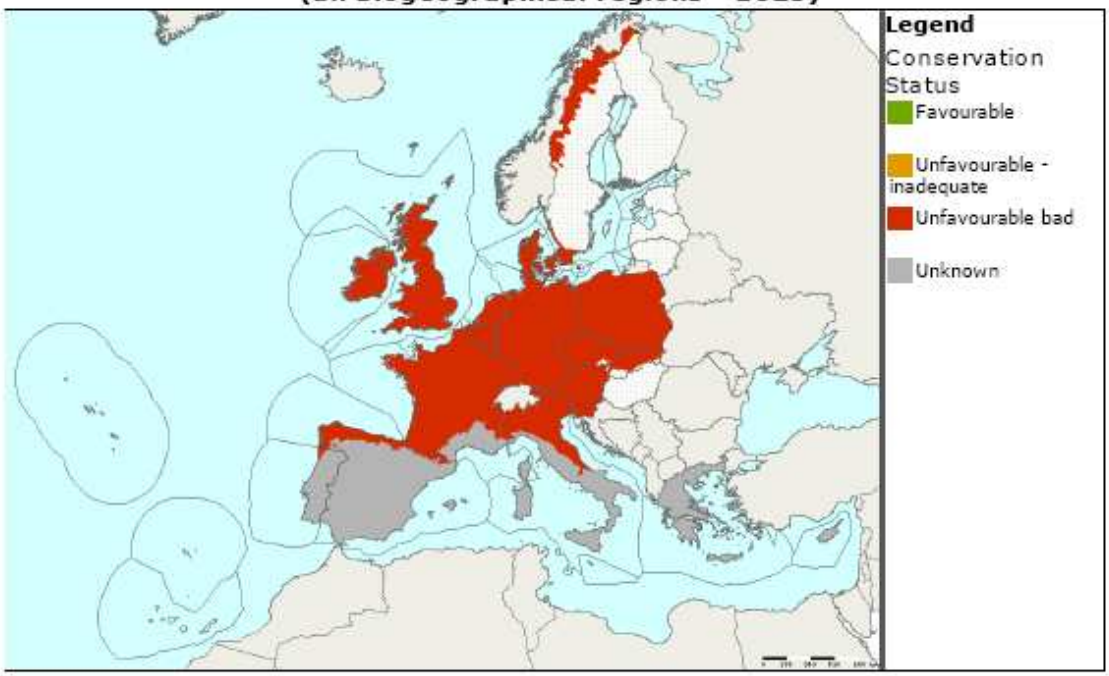
EU Conservation Status Assessment - Habitats Directive Article 17 Report (for 2001–2006)

Habitats Directive Article 17 Reporting European Environment Agency

Species name: **Alytes obstetricans**
Annex: **IV**

Species group: **Amphibians & Reptiles**
Regions: **ALP ATL CON MED**

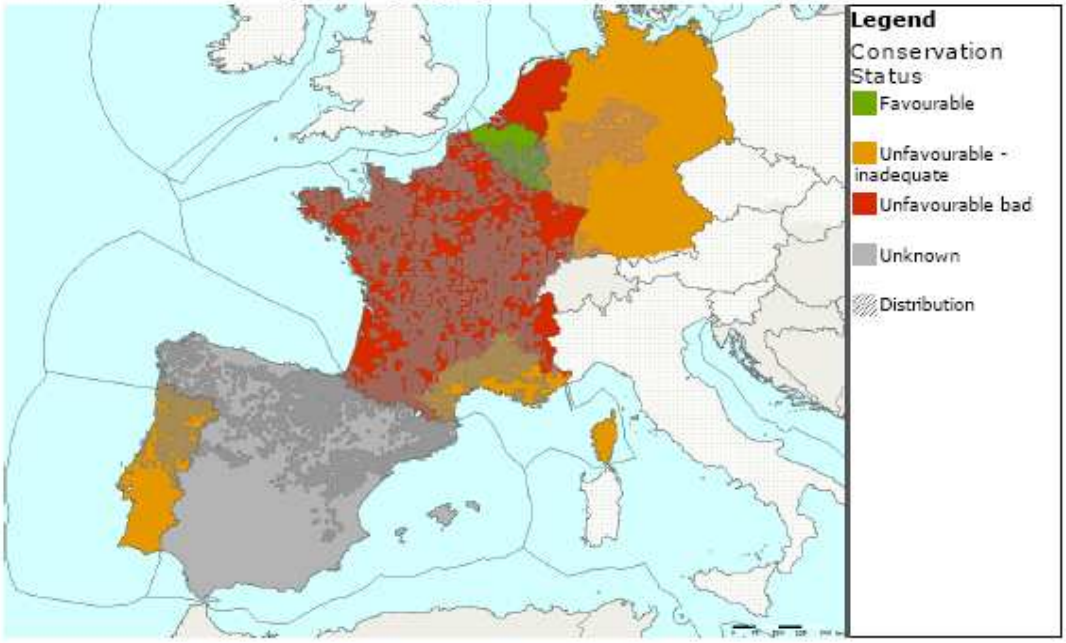
Assessments of conservation status at the European level (all biogeographical regions - EU25)



MS	Region	Conservation status assessment					Population size & unit	Population Trend
		Range	Population	Habitat	Future prospects	Overall		
EU25	ALP						393 grids	
EU25	CON						2038 grids	-
EU25	MED						1977 grids	
EU25	ATL						2310 grids	

The common midwife toad ranges from the northern half of Portugal and Spain and continues to the central Europe. It is tolerant to a broad range of habitats.
The biogeographical assessments for this species are 'unfavourable-bad' for the Alpine, Atlantic and Continental biogeographical regions and 'unknown but not favourable' in the Mediterranean biogeographical region. However it is reported as 'favourable' in Belgium and Luxemburg and good future prospects are reported by Portugal.
According to 2008 IUCN Red List species is assessed as 'least concern' because of its large population and wide distribution.

Assessments of conservation status as reported by Member states (all biogeographical regions - EU25)



MS	Region	Conservation status assessment					Size&unit	Population trend	Data quality
		Range	Population	Habitat	Future prospects	Overall			
ES	ALP						71 - (71) loc.	N/A	
FR	ALP						131 - 298 x	-	2
BE	ATL						83 - 83 grids	=	1
DE	ATL						34 - (34) x	-	1
ES	ATL						305 - (305) loc.	N/A	2
FR	ATL						1487 - 2683 x	-	2
NL	ATL						900 - 5000 indiv.	=	1
PT	ATL						100000 - (100000) indiv.	X	2
BE	CON						680 - 680 grids	=	1
DE	CON						775 - (775) x	-	1
FR	CON						900 - 1980 x	-	2
LU	CON						72 - 72 loc.	=	1
ES	MED						1110 - 1110 loc.	N/A	
FR	MED						298 - 1991 x	=	2
PT	MED						100000 - (100000) indiv.	X	2

Data quality is based on as assessment by each Member State, 1 = good, 2 = medium, 3 = poor

This information is derived from the Member State national reports submitted to the European Commission under Article 17 of the Habitats Directive in 2007 and covering the period 2001-2006. More detailed information is available at http://biodiversity.eionet.europa.eu/article17

ANNEX 3

Table A3. National and regional conservation status of *Alytes obstetricans* on EU Member States and Switzerland.

Member State	National conservation status	Regional conservation status
Portugal	LC (Livro Vermelho 2005)	Not available
Spain	NT (Libro Rojo 2002). *A. obstetricans* sub-species have the following conservation status (Bosch 2002): *A. o. boscai:* NT *A. o. almogavari:* NT *A. o. obstetricans:* NT *A. o. pertinax:* VU A2ac	DD: Murcia (Hernández Gil 2006). LC: Asturias (Nores & García-Rovés 2007)*[12]
France	LC (Liste Rouge 2008)	EN: Alsace (ODONAT, BUFO 2003). VU: Ardennes (Champagne region; Cart 2007), Isère (Rhône-Alpes region; Souan 2007). LC: Pays de la Loire (Marchadour 2004). NT or not threatened: Dordogne (Aquitaine region), Lot-en-Garonne, Pyrénées-Atlantiques (Berroneau *pers. comm.*), Provence-Alpes-Côte d'Azur, Poitou-Charente (Thirion *pers. comm.*). Moreover, the species is locally threatened in Franche-Comté (Pinston *et al.* 2000) and in Aquitaine (above 1500 m; Berroneau *pers. comm.*) regions; while it is not threatened in Auvergne (CSRPN 2004), Île-de-France (Duguet *pers. comm.*), Lozère (Languedoc-Roussillon; Destre 2000) and Ardèche (Rhône-Alpes; Vincent 2005) regions.
Belgium	LC (Jacob *et al.* 2007)	EN: Flanders (Red List; Bauwens & Claus 1996, INBO 2009)
Luxembourg	Currently not endangered (Proess 2003)	
Netherlands	VU (Creemers *et al.* 2007)	
Germany	VU (Kühnel *et al.* 2009)	CR: Bavaria EN: Baden-Württemberg, Hesse, Schleswig-Holstein, Thuringia. VU: Lower Saxony, Saarland and Rhineland-Palatinate. NT: North Rhine-Westphalia, DD: Saxony-Anhalt EXT: Hamburg
Switzerland	EN (Schmidt & Zumbach 2005)	

DD: Data Deficient LC: Least Concern NT: Near Threatened VU: Vulnerable EN: Endangered CR: Critically endangered

[12] Nores Quesada, C. and García-Rovés González, G. (coords.). 2007. Libro Rojo de la Fauna del Principado de Asturias. Obra social La Caixa & Principado de Asturias. 518pp.

ANNEX 4

Table A4. National and regional regulations concerning *Alytes obstetricans* in EU Member States and Switzerland.

Member State	National legal status	Regional legal status
Spain	Species included in the 'List of specially protected wild species' by law "*Real Decreto 139/2011, de 4 de febrero*).	Asturias: Category: "Of Special Interest-relative risk" ("*Decreto 32/90 de 8de marzo de 1990*") Castilla-La Mancha. Category: "Of Special Interest" ("*Decreto 33/98 de 5 de mayo de 1998*"). Catalonia. Category: "Of Special Interest" ("*Decreto Legislativo 2/2008 de 15 abril de 2008*"). Extremadura. Category: "Of Special Interest". ("*Decreto 37/2001 de 13 de marzo de 2001*").
France	Destruction, alteration or degradation of ponds used as breeding sites as well as of any other habitat type used by Amphibians to accomplish their life cycle is banned by law ("*Arrêté du 19 novembre 2007 fixant les listes des amphibiens et des reptiles protégés sur l'ensemble du territoire et les modalités de leur protection. Art. 2. JORF n°0293 du 18 décembre 2007*").	
Belgium		Wallonia. Fully protected species («*Décret du Gouvernement wallon du 6 décembre 2001 relatif à la conservation des sites Natura 2000 ainsi que de la faune et flore sauvages. Moniteur belge du 22 janvier 2002, articles 2 bis, 2 ter, 2 sexies*»). Flanders. Fully protected species ("*Besluit van de Vlaamse Regering met betrekking tot soortenbescherming en soortenbeheer, 15.05.2009*").
Luxembourg	According to the Biodiversity Regulations of 22 March 2002, the State reimburses a share of the resulting costs for the protection of species listed in Annex I. For *Alytes obstetricans*, the reimbursement goes up to 70% of the costs ("*Règlement grand-ducal du 22 mars 2002 instituant un ensemble de régimes d'aides pour la sauvegarde de la diversité biologique*"). The spawning waters and parts of the land habitats of the amphibians are protected by law ("*Loi du 19 janvier 2004 concernant la protection de la nature et des ressources naturelles, Article 17*").	
Netherlands	All amphibian species are protected by the 1998 Flora and Fauna Act ("*Wet van 25 mei 1998, houdende regels ter bescherming van in het wild levende planten- en diersoorten - Flora- en faunawet*").	
Germany	Stricly protected by Federal Nature Conservation Act *(§ 7 Abs. 2 Pkt. 14* "*Bundesnaturschutzgesetz vom 29. Juli 2009*").	
Switzerland	Since 1967, all amphibian species are protected by the federal law on the conservation of nature and landscape (1st July 1966; SR 451) and the federal ordinance on the conservation of nature and landscape (January 16 1991; SR 451.1, Annex 3).	

ANNEX 5

Conservation measures and actions targeting *Alytes obstetricans* in Europe

Transnational project

Countries: **ES, DE, FR, UK, CH**				
Project title: **RACE Risk Assessment of Chytridiomycosis to European amphibian biodiversity**				
Objective	***Main actions***	***Area***	***Period***	***Additional info***
The project aims to assess the situation of *chytridiomycosis* in Europe in order to suggest criteria to guide European-wide policy on conservation actions required in response to the threat posed by this invasive infectious disease.	- Describe the distribution of this fungus in Europe. - Identify the main causes contributing to the on-going spread of disease. - Ascertain which European species are most at risk. - Produce an European Threat Abatement Plan (ETAP).	Spain, Germany, France, United Kingdom, Switzerland	Started in 2009	The project is funded by the EU's ERA-net project BiodivERsA within the EU's 6th Framework Programme for Research.

National and regional conservation measures

Spain

Project title: **Captive Breeding Centre for Threatened Amphibians of the Sierra de Guadarrama**				
Objective	***Main actions***	***Location***	***Period***	***Additional info***
Captive breeding of endangered amphibians to reinforce natural populations.	- Research, evaluation and *in situ* conservation. -Captive breeding of endangered amphibians (currently *A. obstetricans* and *Rana iberica*).	Madrid region, Spain.	Started in 2008-ongoing	The breeding centre is located in Peñalara Natural Park. The project is supported by Madrid's regional government, in collaboration with the Museo Nacional de Ciencias Naturales and the Durrell Wildlife Conservation Trust. http://www.parquenaturalpenalara.org/gestion/fauna/centro-cria-en-cautividad.html
Project title: Monitoring of Spain's Amphibians and Reptiles (Proyecto SARE-AHE)				
Objective	***Main actions***	***Location***	***Period***	***Additional info***
To acquire population data in order to estimate long-term population trends in Spain.	- Amphibian and reptile populations monitoring. - Estimation of short- and long-term population trends for amphibian and reptiles species (including *A. obstetricans*).	Spain	Launched in 2008	The project is carried out by the Spanish Herpetological Society (AHE) and financially supported by the Ministry of Environment, Marine and Rural Affairs (MARM). http://www.herpetologica.org/sare.asp

Project title: **LIFE-Nature project 'Restoration of priority habitats for amphibians' in Valencia**				
Objectives	***Main actions***	***Location***	***Period***	***Additional info***
- To improve the conservation status of 8 amphibians species (including *A. obstetricans*) in the Valencia region. - To create a network of 55 small freshwater bodies of special interest to amphibians within Natura 2000 sites in the region. - To develop a management methodology for various types of freshwater habitats that could be applied at the Mediterranean scale.	- Creation of fauna reserves for amphibians. - Accomplish management plans for 2 species, some habitat types and amphibian reserves. - Habitat restoration including cultivating hydrophitic and hieliophylic plants, eradicating invasive species, control erosion and restoration of hydrological features.	Valencia region, Spain.	October 2005-December 2008	By 2008, 9 reserves were created. Five target species (including *A. obstetricans*) have been observed on restored ponds.

Netherlands

Project title: **LIFE-Nature project 'AMBITION - Amphibian Biotope Improvement in the Netherlands'**				
Objectives	***Main actions***	***Location***	***Period***	***Additional info***
- Encouraging metapopulations for five endangered amphibian species (including A. obstetricans) and preventing isolation and thus genetic erosion. - Connecting isolated populations with the ultimate goal of developing viable metapopulations of the five target species.	The project actions included digging of ponds, restoration of ditches and planting or removal of hedges (depending on their impact on particular species). At Geuldal, in Limburg province, steps were taken to increase a population by connecting clusters of pools and improving terrestrial habitats.	14 sites in Overijssel, Drenthe, Gelderland and Limburg provinces.	June 2004-Dec. 2008	Up to date, population increase has been detected for some of the target species, as Hyla arborea and Bombina variegata.
Project title: Midwife toad and Yellow-bellied toad Species Conservation Plan (Beschermingsplan vroedmeesterpad en geelbuikvuurpad)				
Objective	***Main actions***	***Location***	***Period***	***Additional info***
Establish viable populations of the midwife toad and the yellow bellied toad in the Netherlands.	The actions include digging and restoration of ponds and improve the terrestrial habitat by building small walls and creating stone heaps. Raise public awareness for the two species	Limburg province.	2000-2004, 2006-2010	The protection program is available at www.ravon.nl The action plan 2006-2010 can be downloaded from: www.ikl-limburg.nl/beschermingsplan-vroedmeesterpad-en-geelbuikvuurpad-2006-2010.html

Germany

Project title:*: *Action Plan for the midwife toad (Alytes obstetricans) in Bavaria (AHP für die Geburtshelferkröte -Alytes obstetricans- in Bayern)				
Objective	***Main actions***	***Location***	***Period***	***Additional info***
Stabilize and improve existing populations, promote and restore exchange between subpopulations	Management plans for restoration and improvement of aquatic and terrestrial habitats, according to the 2004 inventory. Creation of ponds in suitable areas, close to the existing populations. *Chytridiomycosis* screening Population monitoring	Bavaria, Rhoen	2006-?	Preliminary results: Böll, S., Hansbauer, 2008. Jahrbuch Naturschutz in Hessen 12: 24-26. (in German).
Project title: Target species concept Baden-Württemberg (Zielartenkonzept in Baden-Württemberg)				
Objective	***Main actions***	***Location***	***Period***	***Additional info***
		Baden-Württemberg		
Project title: Creation of breeding ponds in Rinteln (Lower Saxony) (Anlage von Laichgewässern in Rinteln (Niedersachsen)				
Objective	***Main actions***	***Location***	***Period***	***Additional info***
Creation of breeding ponds		Rinteln (Lower Saxony)		
Project title: Biotope management, breeding and reintroduction in North Rhine-Westphalia (a. o. Mettmann, Wuppertal zoo) (Biotoppflegemaßnahmen, Nachzucht und Wiederansiedlung in Nordrhein-Westfalen (u. a. Mettmann, Zoo Wuppertal))				
Objective	***Main actions***	***Location***	***Period***	***Additional info***
	Biotope management, Breeding Reintroduction	North Rhine-Westphalia		
Project title: Artenschutzprogramm Geburtshelferkröte im Südschwarzwald				
Objective	***Main actions***	***Location***	***Period***	***Additional info***
	Creation of breeding ponds and of terrestrial habitats such as stonewalls Participation (consultation and information) of local authorities, stakeholders and local conservation groups Monitoring of Alytes populations (including search for populations).	Southern Black Forest Freiburg		Regional authority Bezirksstelle für Naturschutz und Landschaftspflege Freiburg

Switzerland

Project title: Action Plan for the midwife toad in the Canton of Lucerne (Artenhilfsprogramm Geburtshelferkröte Kanton Luzern 2000-2009)				
Objectives	***Main actions***	***Location***	***Period***	***Additional info***
- Stabilize/improve all existing local and meta-populations - Improve source populations for re-colonization - Improve connectivity within and between meta-populations - Isolated meta-populations consist of at least 5 local populations - Reach long term viable populations - Improve knowledge and public awareness	- Surveys by local people. - Perform maintenance measures for aquatic and terrestrial habitats following yearly priorityzation. - Create and improve spawning sites in suitable areas, close to the existing populations - Considering species requirements in gravel pit exploitation and in agro-environmental measures	Canton of Lucerne	2000-2009; second phase 2010-2019 (started)	Final report for first phase and action plan for second phase in preparation (Borgula, *in prep*.) And on Borgula & Zumbach 2003.
Project title: Alytes obstetricans Action Plan for the Zurich Canton (Aktionsplan Geburtshelferkröte (Alytes obstetricans) Kanton Zürich)				
Objective	***Main actions***	***Location***	***Period***	***Additional info***
- Reach a conservation status of VU (currently EN) in Zurich Canton. - Reach 100 populations in 10 years. In first 5 years: do not increase vulnerability and accomplish 60-80 populations.	- Perform maintenance measures for spawning areas, prioritized according to the 2003 inventory. - Creation of spawning grounds in suitable areas, close to the existing populations.	Canton of Zurich	2004-2014	Action Plan available at: www.naturschutz.zh.ch (in German).

There are also other ongoing conservation actions for the midwife toad in Switzerland, but not all are presented in the form of an action plan. Some documents can be downloaded at: http://www.karch.ch/karch/d/org/regio/regioco.html#be

France

In France, some conservation measures specifically focused on *A. obstetricans* have been implemented. In the Alsace region, where the species is currently threatened, some specific conservation actions have been carried out such as maintenance of open areas with hides, monitoring of population, digging of ponds, and considering the species conservation needs in quarry exploitation and rehabilitation.

In other French regions, several measures targeting the midwife toad have been implemented, as for example: application of reasonable use of chemical herbicides and maintenance of rain water retention basins in Central region; displacement of a population, continuous monitoring of populations for the national and regional inventories and dissemination of information in Nord-Pas-de-Calais region; and localised monitoring in Poitou-Charentes region.

Also the French Ministry of Ecology is currently publishing Habitats Directive - Annex IV-species factsheets describing the different species under this protection category.

Belgium

Several local protection actions have been implemented in Flanders. A new reproduction pond and terrestrial habitat was created in Neerijse. In Sint-Genesius-Rode the water and terrestrial habitats were improved via different measures. Breeding ponds were restored in Overijse. In Borgloon, new breeding ponds were created and terrestrial habitat and existing ponds were improved. Similar conservation measures will be undertaken in Voeren in 2010.

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