European Tree Frog (*Hyla arborea*) – The Netherlands and Belgium



Conservation status	Atlantic: U1 (-)
	BE: u2 (+)
	NL: FV
Protection status	HD: Annex IV
	Bern Convention: Appendix 2
Population (2007-12)	EU27: > 480,000 - 6,320,000
	individuals
	BE: 4,000 – 5,000 individuals
	NL: 9,660 – 11,900 individuals
MS with genuine	BE, NL
improvement	
Other MS	AT, BG, CZ, DE, DK ES, FR, GR, HU IT,
	LU, PL, PT, LT, LV, RO, SE, SI, SK

Photo Mark Zeghuis, Saxifraga -

Summary: The European Tree Frog is a widespread species with an unfavourable-inadequate conservation status in the majority of its EU range. Populations in the Netherlands and Belgium, amongst other countries, are increasing. The species prefers a mosaic of habitats in landscapes including habitats of early successional stages, such as recently created waters. The species is quite sensitive to changes in habitat, including loss and fragmentation of forests, shrublands and meadows (with the isolation of populations) and the drainage and pollution of wetlands; and the presence of predatory fish species. The most important measures in the Netherlands and Belgium which contributed to the strong increase of the species are the development of connected, large, high quality habitats which facilitate meta-population structures in the landscape. Moreover, an active role of private landowners and the contributions of the project to the local economy and education proved to be essential for a successful implementation of the conservation measures, resulting in long-term involvement of the private and public partners and persistent socio-economic benefits. Factors hampering the conservation of the tree frog are a lack of sufficient funding, and a loss of high-quality habitat due to house- and roadbuilding, which is often compensated with lower quality habitat. As a pioneer species it can settle relatively quickly in high quality habitat, but high connectivity between habitats, monitoring and long-term conservation measures are essential for a sustainable population in the future.

Background

Status and EU occurrence

The European Tree Frog (*Hyla arborea*)¹ is a widespread Palearctic species occurring from Iberia and France, eastwards to western Russia and the Caucasian region, and southwards to the Balkans and Turkey. The conservation status is unfavourable-inadequate in the majority of its range (i.e. Alpine, Atlantic, Black Sea, continental, Mediterranean, pannonian and steppic regions)(Annex 1). In the boreal biogeographical region, it has improved to a favourable status. In the Atlantic biogeographical region, the status has improved from unfavourable-bad in the previous assessment to unfavourable-inadequate.

Most of the European Tree Frog populations in the Netherlands occur on sandy soils in the southern and eastern part of the country, except for one population in the province of Zeeland. The largest population is present in the Achterhoek region in the province of Gelderland. The adjoining Twente region in the province of Overijssel harbours important populations as well, but they are smaller. Some populations have been (re)introduced, including one established with animals from Croatia (Stumpel *et al*, 2009).

The range of occurrence in the EU is 1,835,349 km², which contains at least 494,000 individuals. 230,251 km² of this range is located in the Atlantic biogeographical region, holding a minimum of 13,660 individuals. In the Netherlands (ATL) the frog has an increasing range of 4,600 km², with 214 km² of habitat holding 9,660–11,971

¹ Natura reporting code 1203

individuals. The range is also increasing in Belgium and is 2,200 km², of which 41 km² contains habitat, with 4,000-5,000 individuals (ETC-BD, 2018).

The European Tree Frog is listed on the Dutch Red List as threatened. It is strictly protected under Dutch legislation.

Ecological requirements

The European Tree Frog has preference for a mosaic of habitats in the landscapes including habitats of early successional stages, such as recently developed waters (Stichting RAVON, 2017). This species is generally associated with open, well-illuminated broad-leaved and mixed forests, bush and shrublands, meadows, gardens, vineyards, orchards, parks, lake shores and low riparian vegetation. Dark and dense forests are avoided. Populations can tolerate periods of dryness and can be encountered in dry habitats. Spawning and larval development takes place in stagnant waters with a well-developed vegetation such as lakes, ponds, swamps and reservoirs, and sometimes in ditches and puddles (Kaya *et al*, 2009). These waters are generally relatively shallow and sunny (Stumpel *et al*, 2009).

Pressures and threats

The most frequently reported pressures and threats by the EU Member States in their latest Article 17 assessment were changes in water bodies, modification of cultivation practices, and roads, railroads and paths (ETC/EEA, undated). In the Netherlands the reported pressures of high importance were agricultural intensification, roads and motorways, missing or wrongly directed conservation measures, and invasive non-native species². The most important pressures reported by Belgium were pollution to surface waters, reduction or loss of specific habitat features, predation, modification of standing water bodies and anthropogenic reduction of habitat connectivity³.

The species is quite sensitive to changes in habitat, including loss and fragmentation of forests, shrublands and meadows (with the isolation of populations), and the drainage and pollution of wetlands (industrial and agricultural) and predatory fish species. These impacts on meta-populations have led to declines in parts of Europe, including the Netherlands. The species is collected for the pet trade, and in some parts of its range (western Europe) this might be leading to local population declines (Kaya *et al*, 2009; Stumpel *et al*, 2009). In the Netherlands the quality of the remaining habitat has further declined through removal and/or inappropriate or overdue management of small landscape elements such as hedges and shrubs. Furthermore, populations have suffered from intensive management of roadsides (Van Delft *et al* 2007).

Drivers of improvements: actors, actions and their implementation approaches

Organisers, partners, supporters and other stakeholders

Since 2000, the Dutch government and regional governments have been actively involved in the conservation of the European Tree Frog. They have contributed to a national strategic plan together with NGOs such as RAVON and Natuurmonumenten and European Tree Frog experts. Other plans have been set up together with private land owners and with agricultural nature conservation organisations and provincial landscape foundations.

Also in Belgium, in the LIFE-project 'Triple E Pond area' (Annex 2) actors of public and private landowners worked together in the conservation of the tree frog. The European Landowners' Organization (ELO) is the coordinating beneficiary of the project. It ensures the coordination of the project and collaborates closely with the following project partners: the Agency for Nature and Forest, the OVML, Limburgs Landschap, Regionaal Landschap Lage Kempen, city Hasselt and community Zonhoven.

Moreover, the project is supported by the Flemish government, the Province of Limburg, municipality Heusden-Zolder, De Wijers project, Flemish Land Agency and Natuurpunt Limburg.

² NL Article 17 report

³ BE Article 17 report

http://cdr.eionet.europa.eu/Converters/run conversion?file=/nl/eu/art17/envukhtvq/NL species reports 2013-12-09compleet2.xml&conv=354&source=remote#1203

http://cdr.eionet.europa.eu/Converters/run_conversion?file=/be/eu/art17/envujb4ka/BE_species_reports-13916-154440.xml&conv=354&source=remote#1203ATL

Contributions / relevance of strategic plans

The Dutch strategic plan 2001 – 2005 for conservation of the tree frog (Crombaghs & Lenders, 2001) were essential for the increase of the tree frog. It facilitated the involvement of park rangers as well as land conversion contributing to the implementation of the Netherlands Nature Network. Moreover, it initiated many nature conservation projects, such as the 'Oases van biodiversiteit' and the LIFE-project AMBITION (Ronald Zollinger pers comm, 2018).

Measures taken and their effectiveness

No conservation measures were reported for this species in the Netherlands or in Belgium in their Article 17 reports. Nonetheless, there have been quite some efforts.

The LIFE-project Triple E Pond area (2010-14), covered 4,230 ha at the heart of the Vijvergebied Midden-Limburg area with Belgium⁴. The area is scattered with various bodies of water and is defined by its numerous ponds. The overall objectives for the project were twofold: the restoration of some specific habitats (oligotrophic waters (HD habitats 3120 and 3130), Northern Atlantic wet heaths (4010) and European dry heaths (4030)), and breeding opportunities for the Eurasian Bittern (*Botaurus stellaris*) and the European Tree Frog. At a broader level it also set out to bring together traditionally distrusting stakeholders to foster an environment of collaboration, education, economic activity and exchange. Thus the project focussed on ecology, economy and education.

The most important conservation efforts taken to restore the target species were the restoration of the ecohydrological regime and the opening-up of the entire landscape. Local tourism was enhanced by improving facilities for visitors to the region. New tourist paths, a new car park, new trails, hiking maps and information boards also sought to create more insight into this particular area, with new look-out walls to watch the birds from. Strategically positioned webcams were also foreseen to provide special insight into areas off-limits to visitors due to their sensitive nature as breeding sites. Also very important was the special training of regional guides, which sought to bring recreational and socio-economic dynamism to the Triple E Pond area LIFE-project. The project contributed to a local exhibition on fish farming and ecology. The improved water quality also has benefitted the fish farms. The general public was informed on the project through several channels, for example through educational packages for schools, conferences, the project website, brochures and journals with project updates for local residents. These actions were carried out through the close collaboration of landowners, conservation organizations, municipalities and other partners from the public and private sector. Scientific studies provided a crucial foundation on which to progress and monitor the project, ensuring the achievement of the right results.

The project obtained the following results. Five new ponds were constructed for the tree frog, ensuring that the growing population has a safe breeding site. These ponds are maintained as fish-free, to ensure that the frog's larvae are not predated. In addition to the five new ponds, a further thirteen old ponds were restored and improved to provide favourable conditions for the species. Together these ponds provide the tree frogs with additional areas of undisturbed habitat in which to breed. Nearly 40 ha of new land-based habitat has also provided in clearings between the water and the woodland and scrub. As a result of this the number of calling male tree frogs increased from between 100 and 150 to at least 500 breeding calling males in 17 ponds in the area.

Other supporting measures included the restoration of the Bolderberg moorlands. This involved the creation of large inlets and outlets to increase the flow of water with improved quality into the project area. To this end, the partners cleaned-up more than 15 km of existing canals, constructed several kilometres of new ditches and channels, and installed dykes and underground connection systems. Furthermore, the landscape was re-opened through the clearance of nearly 200 ha of pond embankments, opening them to public access, by cutting back trees and shrubs along the bank. Over 10 ha of dry heaths was restored and a further 18 ha improved. By cutting down trees (thereby reducing shade) and carrying out additional hydrological works, almost 8 ha of wet heath was restored.

To restore the habitat and breeding opportunities for the tree frog and the Eurasian Bittern, it turned out to be crucial that private landowners were given opportunities to take on an active role in the project. Many of the local stakeholders, including landowners, have testified that the renewed spirit of cooperation is what they found most satisfying about the project. Moreover this spirit of reconciliation and collaboration is set to continue

⁴ <u>http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=3529</u>

with all partners signing an agreement to continue to conserve and maintain the actions in the field for the next 20 years. This constitutes a 'life after life' management plan, which will ensure that the ecological but also socioeconomic results that have been achieved are not lost with the conclusion of the LIFE-project "Triple E Pond area" (EC, 2012).

The Life-AMBITION project (Annex 2) targeted several amphibian species, including the European Tree Frog, in the Netherlands between 2000-08⁵. In approximately 200 locations in 14 sites in the provinces of Drenthe, Overijssel, Gelderland and Limburg habitats were restored and enlarged and sustainable ecological corridors were created between the habitats. The Provinces, area managers and species-protection organisations worked closely together in the conservation measures and the public information activities in order to involve the public at large and the local population in the conservation actions for the targeted species.

For the tree frog meta-population structures were created in four phases. First, existing habitats were safeguarded from external influences. Second, these habitats are enlarged and third, connected to each other. Fourth, new habitats were created and connected to the existing network. The implementation of corridors and migration routes have created a sustainable network in which the amphibians can also migrate between core areas. In order to guarantee the quality of this network, it was developed especially in and around Natura 2000 areas. The general public and area managers were informed about the ecology of the target species and understanding of the importance of improving their habitats through (international) workshops and excursions, brochures, a website, and technical recommendations for the laying out of suitable areas of habitat. At all the project sites where work was in progress, special AMBITION notice boards were erected to display information about the project, the species of amphibians and the parties involved. RAVON was involved as a technical-ecological adviser throughout the project and conducted monitoring activities during the project.

The European Life-AMBITION Project created and /or restored hundreds of spawning waters and adjacent terrestrial habitat. Existing pools were improved and new pools excavated. Neighbouring dry habitats were enhanced by the construction of walls and wooded banks and by allowing more bushes and shrubs to grow. In order to extend the area of habitat, additional areas were created or restored in the immediate surrounding areas. At the end of the project, in 2008, four sites were already colonised by the tree frog, a positive result. Taking into account the fact that in general it takes several years for amphibians to colonise such pools, this increase was regarded as positive (EC, 2008; Thomas Wouters, pers comm, 2018).

Since the end of the project the tree frog has increased in the Netherlands overall, but has shown regional differences in trends. Limited growth or declines in population size can possibly be attributed to the loss of pioneer habitats, such as the newly excavated pools and the introduction of fish (Stichting RAVON, 2017).

Funding sources (current and long-term) and costs (one-off and ongoing)

The funding of the LIFE-projects in the Netherlands and Belgium, used for the benefit of the tree frog amongst other species and habitats, consisted of a total amount of €4 million of which 50% was co-funded by the LIFE+ program. Furthermore, the Dutch government provided funding and the NGO RAVON invested in it as well. Total funding sources, costs and ongoing costs are not known (Ronald Zollinger personal comm, 2018).

Future actions

Flanders adopted the tree frog as a priority species in the PAF for the period of 2014 to 2020. The LIFE-project BNIP - Belgian Nature Integrated Project (LIFE14 IPE/BE/000002) has the objective to implement the PAF. Future prospects in the Flemish region are cautiously judged as positive, although, as a pioneer species, the European Tree Frog shows inherently high fluctuations in population size. To guarantee its long-term presence in the region, further restoration will be required to enhance habitat quality and connectivity in order to increase the number of individuals in several (meta)populations and maintain their healthy genetic diversity.

The species is not adopted in the PAF of the Netherlands, as the species does not require special actions anymore (Ministry of EZ, 2016). However, conservation measures should be documented in strategic plans in order to maintain the habitats in the long term. When habitats for the tree frog are not maintained they only function properly for at most ten years. All populations should be monitored in order to facilitate quick response to a decline in the populations. The networks of habitats should be extended and the cyclical management should be continued (EC, 2008).

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http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=home.createPage&s_ref=LIFE04%20NAT/NL /000201&area=1&yr=2004&n_proj_id=2612&cfid=7185110&cftoken=3fbfca418d37bef3-3B44AFFC-F4C7-1A35-036F9

Achievements

Impacts on the target species

The largest impacts of the conservation measures for the European Tree Frog in the Netherlands have occurred within the Achterhoek area: the number of occupied kilometre squares rose from 11 in 1985 to 62 in 2006 and the number of calling males increased from 250 in 1991 to 2,300 in 2006, calling from 109 water bodies (Stumpel *et al*, 2009).

Although the Article 17 reports show no significant increase in the Dutch population and range, experts report a genuine increase between 2007 and 2012 to at least 9,660 individuals in 4,600 km². The difference can partly be attributed to methodological differences. In Belgium the range increased from 875 km² to 2,200 km² containing a minimum of 4,000 individuals (ETC-BD, 2018).

Other impacts (e.g. other habitats and species, ecosystem services, economic and social)

Other species targeted by the LIFE-project AMBITION were Common Midwife Toad (*Alytes obstetricans*), Yellowbellied Toad (*Bombina variegate*), Common Spadefoot (*Pelobates fuscus*) and Great Crested Newt (*Triturus cristatus*) (EC, 2018). In some areas the conservation of these species could be combined with flood regulation (Ronald Zollinger pers comm, 2018).

As described above, the Triple E Pond area LIFE project targeted several wetland and heathland habitats, and the Eurasian Bittern, as well as European Tree Frog. It had an innovative approach in combining ecology and education with the economic activity of fish-farming (EC, 2012).

Conclusions and lessons learnt

The key targeted conservation measures that led to the improvements

- Improvement and expansion of a connected network of high quality habitat areas.
- Construction of sufficiently large terrestrial habitats and ponds.

Conservation measures that have not been sufficiently effective

• Projects which included construction of fragmented and small ponds scattered throughout the region appeared to be less effective in increasing the population of European Tree Frogs than projects which constructed highly connected habitats (Ronald Zollinger pers comm, 2018).

Factors that supported the conservation measures

- An active role of private landowners and the contributions of the project to the local economy and education of the general public and park rangers proved to be essential for a successful implementation of the conservation measures, the long term involvement of the private and public partners and the long term socio-economic benefits.
- Focussing on exotic looking ambassador species such as the tree frog helped to gain attention.
- The species' listing on the Dutch Red List and protection under the Habitats Directive and national legislation.

Factors that constrained conservation measures

- House and roadbuilding can lead to a loss of high quality habitat. When this loss is compensated by the creation of new habitat, this new habitat often appears to be of lower quality, which is less suitable for the European Tree Frog (Ronald Zollinger pers comm, 2018).
- The continuity of the funding of conservation measures can be difficult to maintain. When funding stops, the management stops, which can lead to a decrease in the population of European Tree Frogs (Ronald Zollinger pers comm, 2018).

Quick wins that could be applied elsewhere for the species

• Development of high-quality habitat proved to be a successful tool to expand the population of European Tree Frogs. However, habitat connectivity and maintenance of the quality and pioneer stages of the habitat and corridors is essential to prevent the population from dying out after a few years.

Examples of good practice, which could be applied to other species

• The Triple E Pond area LIFE project's focus on the combination of ecology, economy and education, which contributed to the long term engagement of stakeholders.

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Authorship

Prepared by Marjon Hendriks of PBL, as part of the European Commission study on identifying the drivers of successful implementation of the Birds and Habitats Directives (under contract ENV.F.1/FRA/2014/0063), carried out by the Institute for European Environmental Policy, BirdLife International, Deloitte, Denkstatt, Ecologic, ICF Consulting Services and PBL Netherlands Environmental Assessment Agency.

The information and views set out in this case study are those of the authors and do not necessarily represent the official views of the Commission.

Annex 1 Hyla arborea conservation status at EU and Member State levels

FavourableFVUnknownXXUnfavourable - inadequateU1Unfavourable - badU2Qualifier (+) improving (-) deteriorating (=) stable (x) unknown (n/a) not reported

	2001-06	2007-12				
	Overall	Range	Population	Habitat for species	Future	Overall (with trend)
AT (ALP)	U1-	U1	U1	U1	U1	U1 (-)
BG (ALP)	N/A	FV	FV	U1	U1	U1 (=)
DE (ALP)	U1	FV	U1	U1	U1	U1 (-)
ES (ALP)	XX	U1	XX	U1	XX	U1 (x)
FR (ALP)	U2	U1	XX	U2	XX	U2 (x)
IT (ALP)	U1	U1	U1	U1	U1	U1 (-)
PL (ALP)	XX	ХХ	XX	XX	XX	XX
RO (ALP)	N/A	FV	FV	FV	U1	U1
SI (ALP)	U1	FV	ХХ	U1	ХХ	U1 (-)
SK (ALP)	U1	FV	ХХ	U1	ХХ	U1 (=)
EU overall (ALP)	U1	U1	XX	U1	ХХ	U1 (-)
BE (ATL)	U2	FV	U2	U1	U1	U2 (+)
DE (ATL)	U1	U1	U1	U1	U1	U1 (-)
ES (ATL)	U2 (+)	U1	XX	U1	ХХ	U1 (x)
FR (ATL)	U2	U1	FV	FV	ХХ	U1 (-)
NL (ATL)	U2 (+)	FV	FV	FV	FV	FV
PT (ATL)	U1	FV	ХХ	XX	ХХ	XX
EU overall (ATL)	U2	U1	U1	U1	ХХ	U1
BG (BLS)	N/A	FV	FV	U1	U1	U1 (-)
RO (BLS)	N/A	FV	FV	FV	ХХ	FV
EU overall (BLS)	ХХ	FV	FV	U1	ХХ	U1
LT (BOR)	U2 (+)	FV	U1	U1	U1	U1 (=)
LV (BOR)	FV	FV	FV	FV	FV	FV
EU overall (BOR)	U2	FV	FV	FV	FV	FV (=)
AT (CON)	U1 (-)	U1	U1	U1	U1	U1 (-)
BG (CON)	N/A	FV	FV	U1	U1	U1 (x)
CZ (CON)	U1 (+)	FV	FV	FV	ХХ	FV
DE (CON)	U1	U1	U1	U1	U1	U1 (-)
DK (CON)	U1 (+)	U1	FV	FV	U1	U1 (x)
FR (CON)	U2	U1	FV	U1	ХХ	U1 (-)
IT (CON)	FV	FV	FV	U1	U1	U1 (-)
LU (CON)	U2	U2	U2	U2	U2	U2 (-)
PL (CON)	ХХ	FV	FV	ХХ	FV	FV
RO (CON)	N/A	FV	U1	U1	U1	U1
SE (CON)	U2 (+)	FV	FV	FV	FV	FV

	2001-06	2007-12				
	Overall	Range	Population	Habitat for species	Future	Overall (with trend)
SI (CON)	U1	FV	XX	U1	XX	U1 (-)
EU overall (CON)	U1	U1	U1	U1	U1	U1 (-)
GR (MED)	FV	FV	FV	XX	FV	FV
ES (MED)	U1 (-)	U1	XX	U1	XX	U1 (x)
IT (MED)	FV	U1	XX	U1	U1	U1 (-)
PT (MED)	U1	FV	XX	XX	XX	XX
EU overall (MED)	U1	U1	XX	XX	XX	U1 (-)
CZ (PAN)	U1	FV	FV	FV	XX	FV
HU (PAN)	U1	FV	FV	FV	FV	FV
RO (PAN)	N/A	U1	U1	U1	U1	U1
SK (PAN)	U1	FV	U1	U1	U1	U1
EU overall (PAN)	U1	FV	FV	FV	U1	U1 (=)
RO (STE)	N/A	FV	FV	FV	U1	U1
EU overall (STE)	ХХ	FV	FV	FV	U1	U1 (x)

Source: Member State Article 17 reports for *Hyla arborea* as compiled by ETC-BD on EIONET <u>https://bd.eionet.europa.eu/article17/reports2012/</u>

Annex 2. LIFE Nature Projects in Belgium and the Netherlands that aimed to help conserve the European Tree Frog (*Hyla arborea*)

Project Title	Project N°	MS	Type Of Beneficiary
AMBITION - Amphibian Biotope Improvement in the Netherlands	LIFE04 NAT/NL/000201	NL	National authority
Triple E Pond area M-L - Ecological restoration of the Pond area M-L through a close participation of the private and public landowners and a triple E-approach	LIFE08 NAT/B/000036	BE	Professional organisation

Source: Life Programme database, projects with "Hyla arborea" listed in the Member States of the Netherlands or Belgium