

# The reintroduction program of the Montseny brook newt, *Calotriton arnoldi*

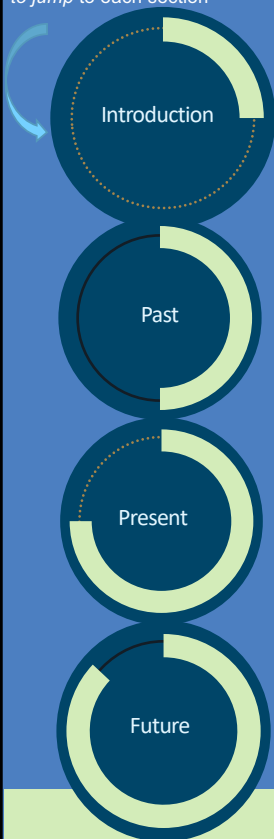
Gerardo Garcia<sup>1</sup>, Tom Jameson<sup>1</sup>, Daniel Guinart<sup>2</sup>, Felix Amat<sup>3</sup>, Manel Areste<sup>4</sup>, Francesc Carbonell<sup>5</sup> & Monica Alonso<sup>5</sup>.

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## Summary

- The Montseny brook newt (*Calotriton arnoldi*) is an endemic amphibian of Montseny Natural Park, Catalonia, Spain.
- *C. arnoldi* is listed as critically endangered by the IUCN based on its small range and population size. The total extent of the streams in which the species lives is less than 5 km and the maximum adult population size is not bigger than 2000 individuals.
- At the end of 2016 the project "Life Tritó Montseny" (LIFE15 NAT/ES/000757) was established with the founding goal of "improving the conservation status of the Montseny newt and its riverine habitat".
- As part of the Life Tritó Montseny project a captive breeding and reintroduction program for *C. arnoldi* is being carried out to establish both an insurance population and extend the range of the species.
- After first reintroductions in 2007 we start recording successful established and breeding populations.

## Introduction

The Life Tritó Montseny project was launched to protect the critically endangered Montseny newt (*Calotriton arnoldi*) in 2016. Forty-nine initiatives will be carried out between 2016 and 2020 with the goal of "improving the conservation status of the Montseny newt and its riverine habitat". These initiatives are coordinated by six working groups: (1) Legislation, (2) populations, (3) hydrology, (4) habitat, (5) research, and (6) education. The second working group functions to increase the range and raise the number of *C. arnoldi* in the wild by reintroducing captive bred newts from four breeding centres (Wildlife Management of Torreferrussa and Pont de Suert, Barcelona Zoo and Chester Zoo). From 22 wild founders, an average of 300 newts/year have been produced for release.



## Introduction

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[www.lifetritomontseny.eu](http://www.lifetritomontseny.eu)  
#LifeTritóMontseny



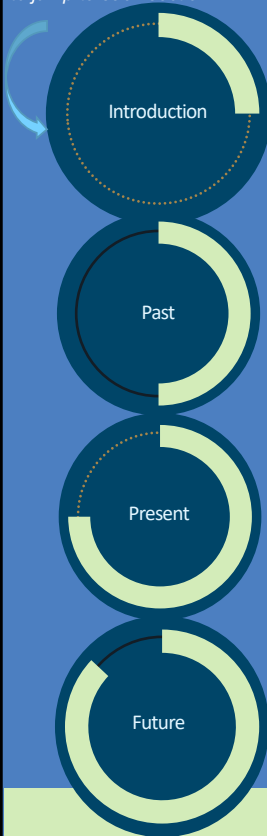
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## Background

- The first populations of the *Calotriton arnoldi* were identified as the Pyrenean newt (*Calotriton asper*) in 1979<sup>1</sup>. Subsequent studies were conducted in late 2005, leading to the discovery that these Montseny populations actually belonged to a completely different and new species<sup>2</sup>.
- C. arnoldi* is split between an eastern and western population that are morphologically, geographically, and genetically distinct.
- Within the park the western population is restricted to four spring systems, and the eastern to three.
- Take six years to reach sexual maturity.



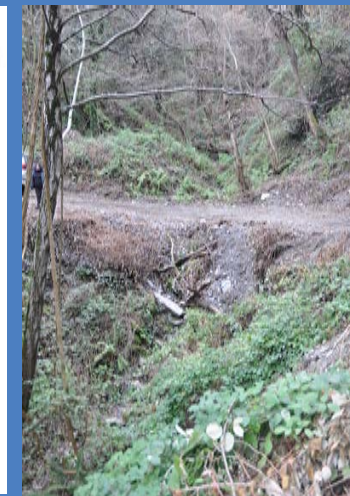
*Calotriton arnoldi* eastern form (above) characterised by white nose spot in males, and western form (below) lacking white spot in males, and often with green spots on body.



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## Threats

*Calotriton arnoldi* is listed as critically endangered by the IUCN due to a very restricted range of less than 5 km<sup>2</sup> and a estimated adult population of only 2000 individuals.



Threats to *Calotriton arnoldi* and dried spring by illegal road.

Past



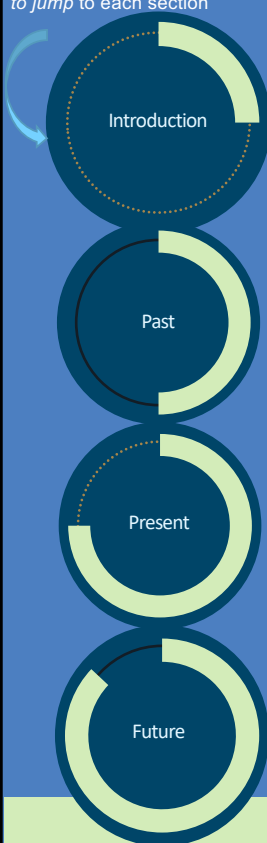
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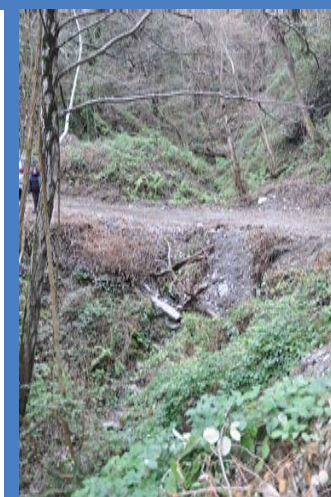
Range of *Calotriton arnoldi* <sup>3</sup>.



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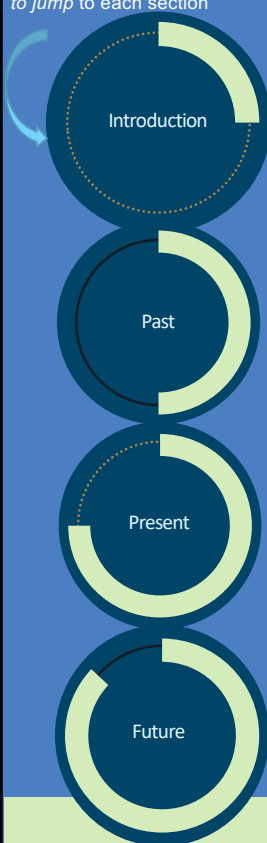
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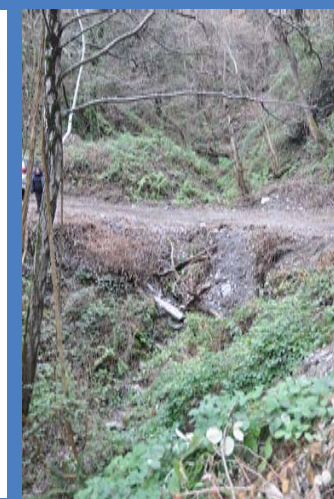


Typical habitat of *Calotriton arnoldi*.



## Threats

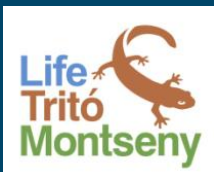
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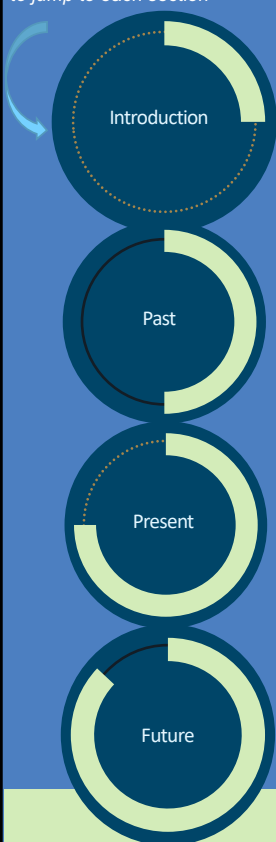
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## Breeding in Captivity

- As part of the “population” working group of the Life Tritó Montseny project four breeding centres operate to maintain an insurance population for *Calotriton arnoldi* and breed individuals for reintroduction into the wild.
- The founder population was established from individuals caught from the wild in 2007 and 2010, six males and six females from the eastern population and five males and five females from the western population.
- *C. arnoldi* is bred in specialist bio-secure facilities to ensure no external pathogens are transferred to the wild population upon reintroduction.
- From this founder stock an average of 300 newts/year have been bred for reintroduction.



Location of breeding centres.



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## Reintroductions

- Trial reintroduction of *Calotriton arnoldi* into Montseny Natural Park but outside of the range of the wild population has taken place to test the viability of captive individuals/ new habitat for reintroductions.
- Nearly 500 individuals of the western population and over 200 of the eastern population were released to new spring systems in between 2010 and 2015.
- Visual Implant Elastomers (VIE) are used for identification of individuals for monitoring.
- Monitoring of the success of these reintroductions is ongoing. Of the four release sites only one has recorded breeding success. The outcomes from this research will be used to inform the reintroduction plan going forwards.



Reintroduction of *Calotriton arnoldi* into the wild in 2010.



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Present

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[www.life-tritomontseny.eu](http://www.life-tritomontseny.eu)  
#LifeTritóMontseny



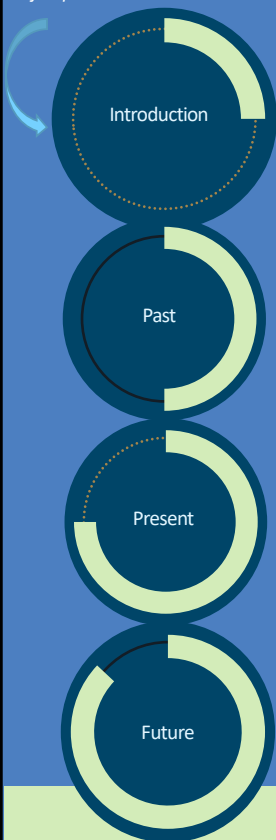
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Breeding facility at Barcelona Zoo (left) and Chester Zoo (right).

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Population	Reintroduction date	Locality	Age released larvae (years)	N. larvae reintroduced
OCCIDENTAL	2010	OCC 1	3	112
OCCIDENTAL	2011	OCC 1	3	180
OCCIDENTAL	2012	OCC 1	2	33
OCCIDENTAL	2012	OCC 1	1	48
OCCIDENTAL	2014	OCC 1	3	5
OCCIDENTAL	2014	OCC 1	2	7
OCCIDENTAL	2014	OCC 1	1	5
OCCIDENTAL	2014	OCC 2	<1	62
OCCIDENTAL	2015	OCC 2	1	17
OCCIDENTAL	2015	OCC 2	<1	27
ORIENTAL	2011	OR 1	3	123
ORIENTAL	2014	OR 1	3	8
ORIENTAL	2014	OR 1	2	11
ORIENTAL	2014	OR 1	4	24
ORIENTAL	2014	OR 2	1	19
ORIENTAL	2014	OR 2	<1	12
ORIENTAL	2014	OR 2	<1	10
ORIENTAL	2015	OR 2	<1	21
TOTAL				724

Reintroduction data for *Calotriton arnoldi* released into new localities around Montseny Natural Park since 2010. (Occidental = western population, Oriental = eastern population).

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Population	N. released larvae	Age larvae	Survived larvae	Breeding success
OCCIDENTAL 1	390	2-3	✓	✓
OCCIDENTAL 2	106	0-1	?	?
OCCIDENTAL 1	166	2-4	✗	✗
OCCIDENTAL 2	62	0-1	?	?



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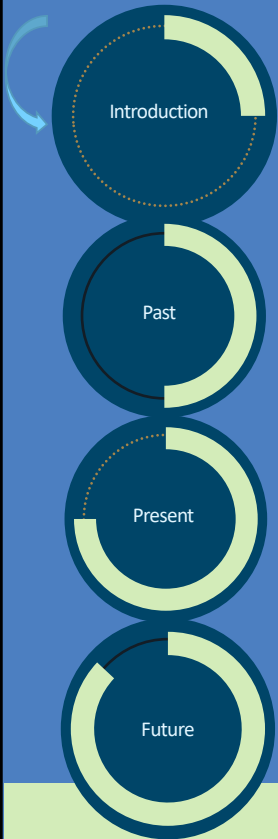
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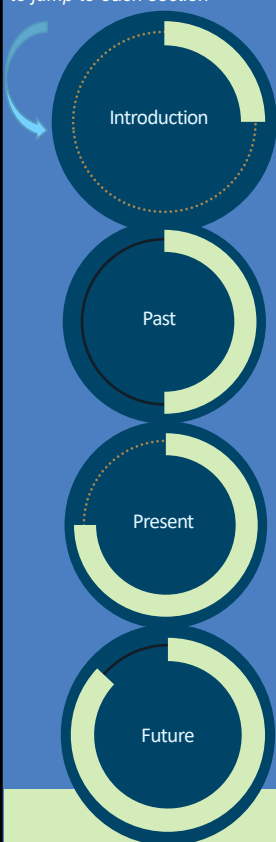
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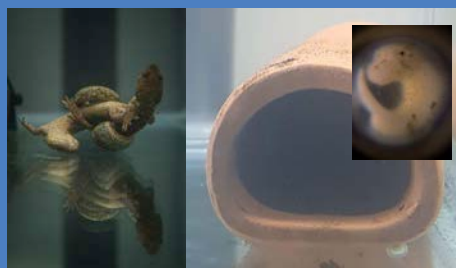
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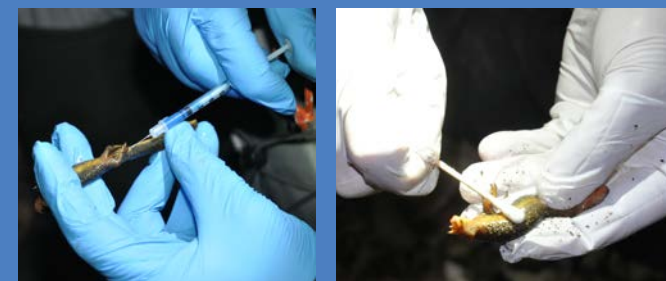
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*Calotriton arnoldi* mating (left) and egg (right) at Chester Zoo.

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Marking *Calotriton arnoldi* with Visual Implant Elastomer prior to reintroduction (left). Bd testing of wild *Calotriton arnoldi* (right).

Present



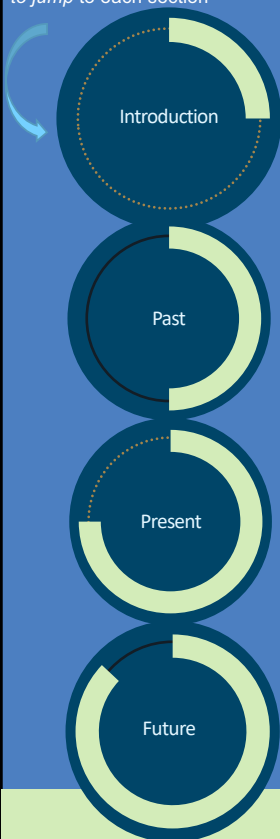
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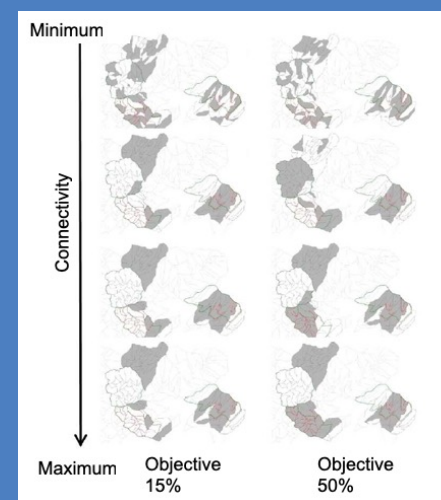
## Future Goals

- Further development of captive breeding centres to incorporate a minimum of 90% of the genetic variability of the wild population of *Calotriton arnoldi*.
- Further expansion of breeding centre capacity to quadruple annual larval production relative to the wild population of *C. arnoldi*.
- Doubling number of streams containing *C. arnoldi* by reintroduction, creating six new populations.

## Next steps

- Increase the distribution area of the species by creating and consolidating new populations from the captive stocks maintaining the genetic structure of the two subpopulations.
- Production of European Association of Zoos and Aquaria (EAZA) best practice guidelines for *C. arnoldi*.
- Development of bio-secure live food cultures for captive breeding facilities.
- Transfer of population management to ZIMS.
- Investigation of further husbandry actions to improve fertility.

## Future



Management units based on different quantitative objectives and level of connectivity.



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## References

1. Clergue-Gazeau, M., Bonnet, L. (1979). Analyse biometrique de composants du squelette de l'urodele *Euproctus asper*. 2. Populations d'altitude et de localisation géographique différentes. Bulletin de la Société d'Histoire Naturelle de Toulouse, 115 (3-4) : 425-438.
2. Carranza, S., Amat, F. (2005). Taxonomy, biogeography and evolution of *Euproctus* (Amphibia: Salamandridae), with the resurrection of the genus *Calotriton* and the description of a new endemic species from the Iberian Peninsula. Zoological journal of the Linnean Society, 145 (4): 555-582.
3. Carranza, S., Martínez-Solano, I. (2009). *Calotriton arnoldi*. The IUCN Red List of Threatened Species 2009.



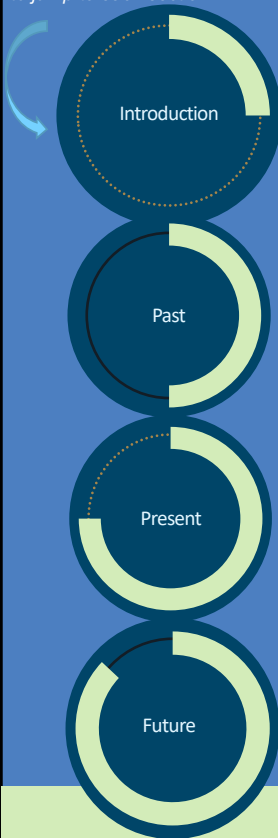
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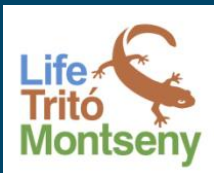
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Adult *Calotriton arnoldi* during night survey in Montseny Natural Park.

## References

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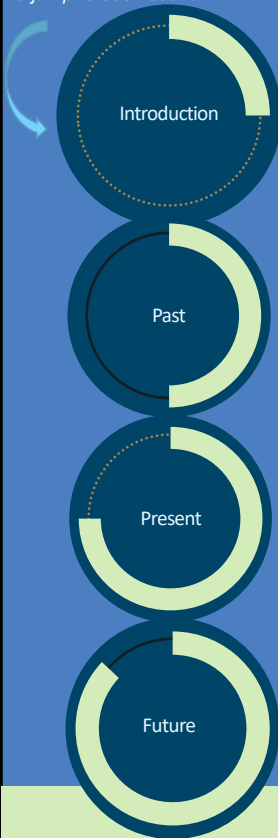
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- Further development of captive breeding centres to incorporate a minimum of 90% of the genetic variability of the wild population of *Calotriton arnoldi*.
- Further expansion of breeding centre capacity to quadruple annual larval production relative to the wild population of *C. arnoldi*.
- Doubling number of streams containing *C. arnoldi* by reintroduction, creating six new populations.

## Next steps

- Increase the distribution area of the species by creating and consolidating new populations from the captive stocks maintaining the genetic structure of the two subpopulations.
- Production of European Association of Zoos and Aquaria (EAZA) best practice guidelines for *C. arnoldi*.
- Development of bio-secure live food cultures for captive breeding facilities.
- Transfer of population management to ZIMS.
- Investigation of further husbandry actions to improve fertility.

## Partners



## References

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## Future

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