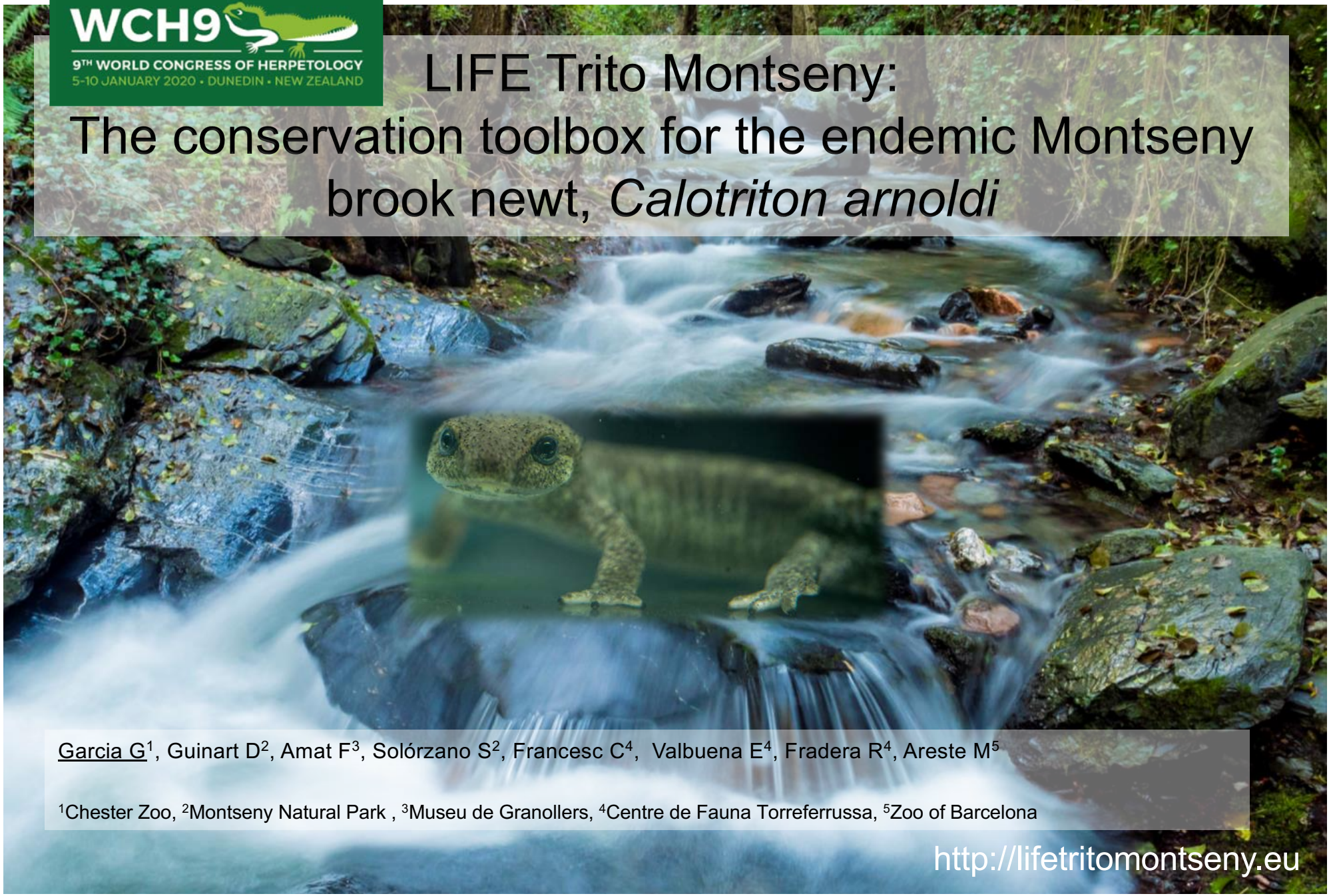
WCH9
9TH WORLD CONGRESS OF HERPETOLOGY
5-10 JANUARY 2020 • DUNEDIN • NEW ZEALAND

LIFE Trito Montseny:
The conservation toolbox for the endemic Montseny brook newt, *Calotriton arnoldi*



Garcia G[1], Guinart D[2], Amat F[3], Solórzano S[2], Francesc C[4], Valbuena E[4], Fradera R[4], Areste M[5]

[1]Chester Zoo, [2]Montseny Natural Park , [3]Museu de Granollers, [4]Centre de Fauna Torreferrussa, [5]Zoo of Barcelona

http://lifetritomontseny.eu

Contents

- Status of the specie and Montseny Natural Park
- Management Programme Riparian Forest (LIFE)
- Habitat management
- Conservation (in and ex situ)

Results reintroductions

Challenges for the systematic planning of new populations

Lessons learnt creating new wild populations

Next lines to continue supporting the reintroductions

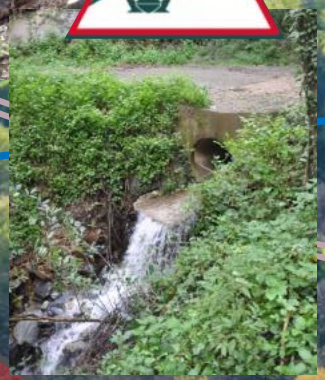
The Montseny brook newt, *Calotriton arnoldi*

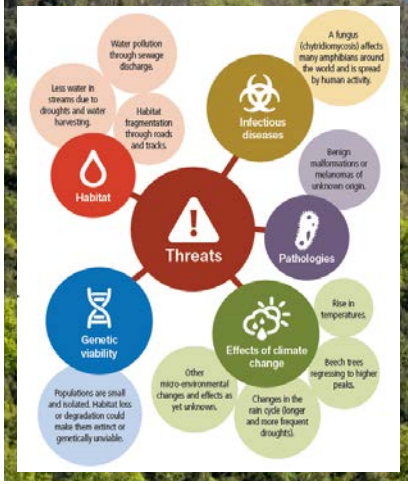
CATALONIA

31.89 km^2 · 7,5 million inhabitants

Density: 234 people / Km^2

Montseny Natural Park Threats





Montseny Natural Park Status

- High visitor frequency (> 1 million visitors/ year) with impact on riparian habitats
- Ignorance of the function of riverside forest in the Mediterranean ecosystem
- Doubtful ecological sustainability of natural resources (water, timber) exploitation
- Montseny brook newt is an unknown and undervalued endemism
- 85% of Montseny newt populations are inside private property
- Water harvesting causes some stretches of stream to dry up (24% Spanish bottled water)
- Habitat fragmentation due roads and forest tracks
- Disappearance of riverside forest due traditional forest activity

Management Programme Riparian Forest

Conservation
(in-situ & ex-situ)

Montseny brook newt Status

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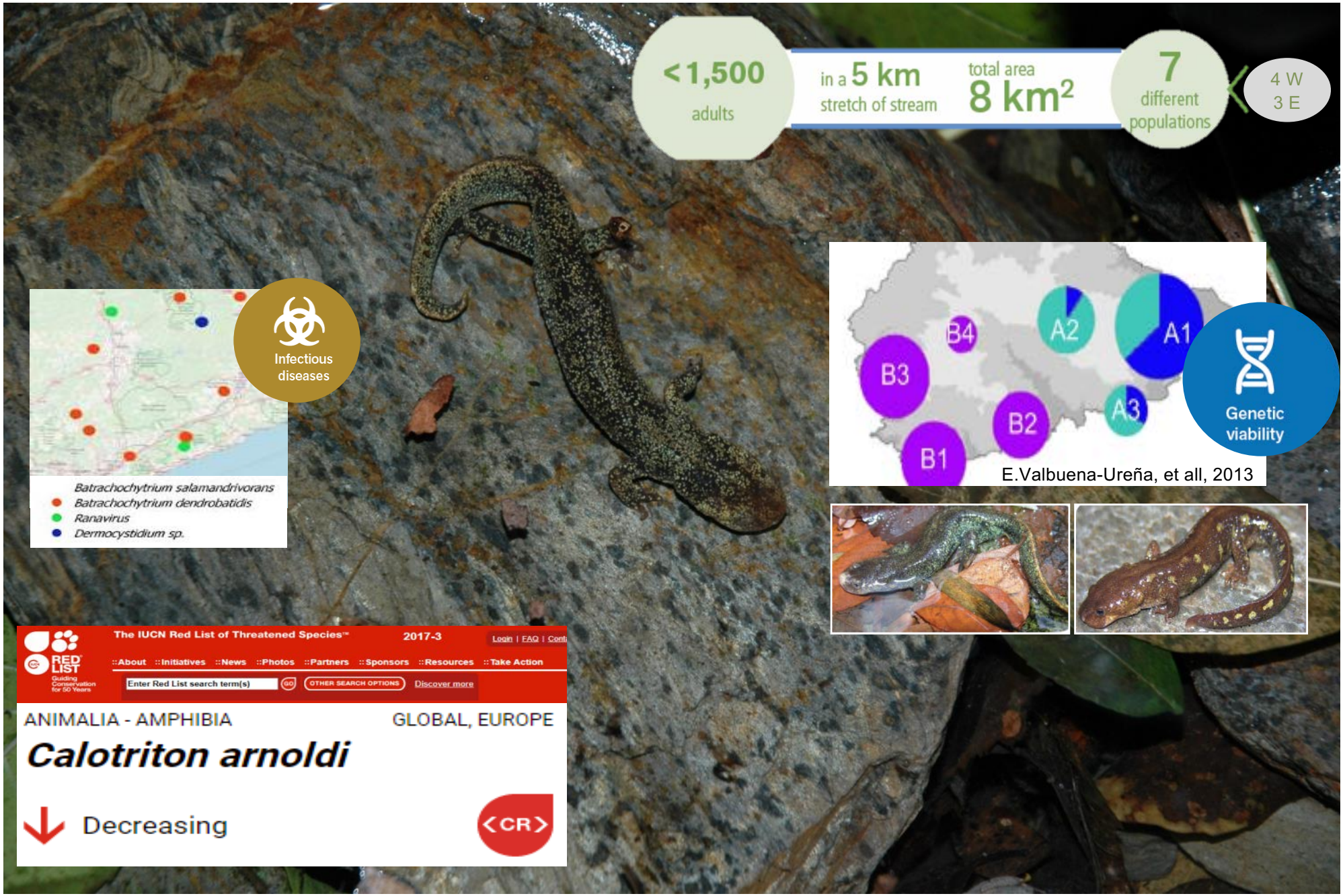


Life Trit Montseny - Conservacion del Triton del Montseny (Calotriton arnoldi): gestion del habitat, de su poblacion y educacion ambiental.

LIFE15 NAT/ES/000757

Oct. 2016 / Dec. 2020

Management Programme Riparian Forest

OBJECTIVES

To conserve the Montseny newt

(endemic and critically endangered)

To improve river habitat

(in regression with anthropogenic threats)

OPERATIONAL TARGET

Protection

Dissemination & Education

Conservation (in-situ & ex-situ)

Research & Monitoring

Habitat management

METHOD

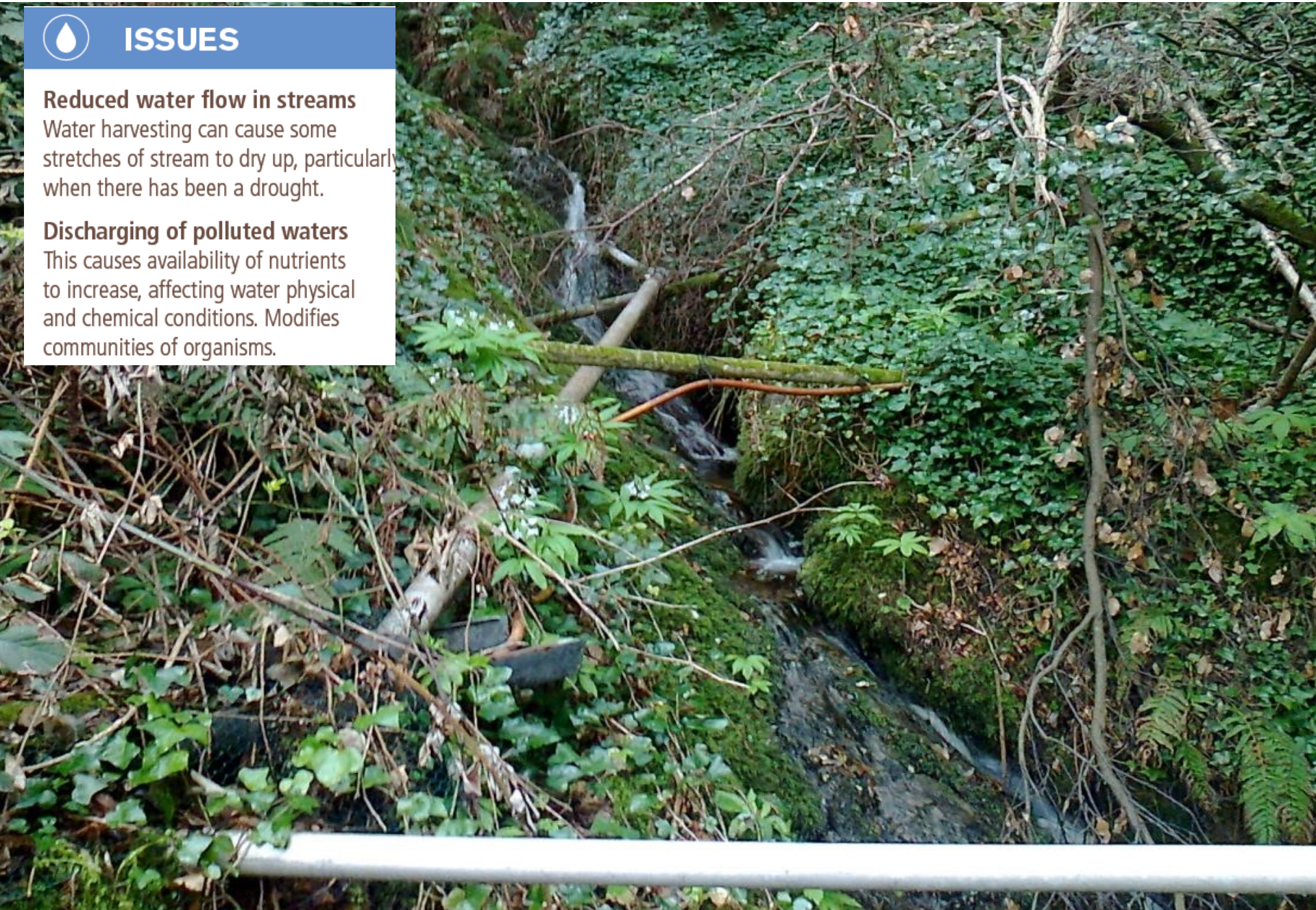
- **> 120** people involved in multidisciplinary teams
- **6** Areas of work, with **49** different actions

Budget: 2.971.276 € (60 % EU)

Period: Oct. 2016 / Dec. 2020

SITUACIO INICIAL

Water use



ISSUES

Reduced water flow in streams
Water harvesting can cause some stretches of stream to dry up, particularly when there has been a drought.

Discharging of polluted waters
This causes availability of nutrients to increase, affecting water physical and chemical conditions. Modifies communities of organisms.

Habitat management

Improvement of water use from the river and rain

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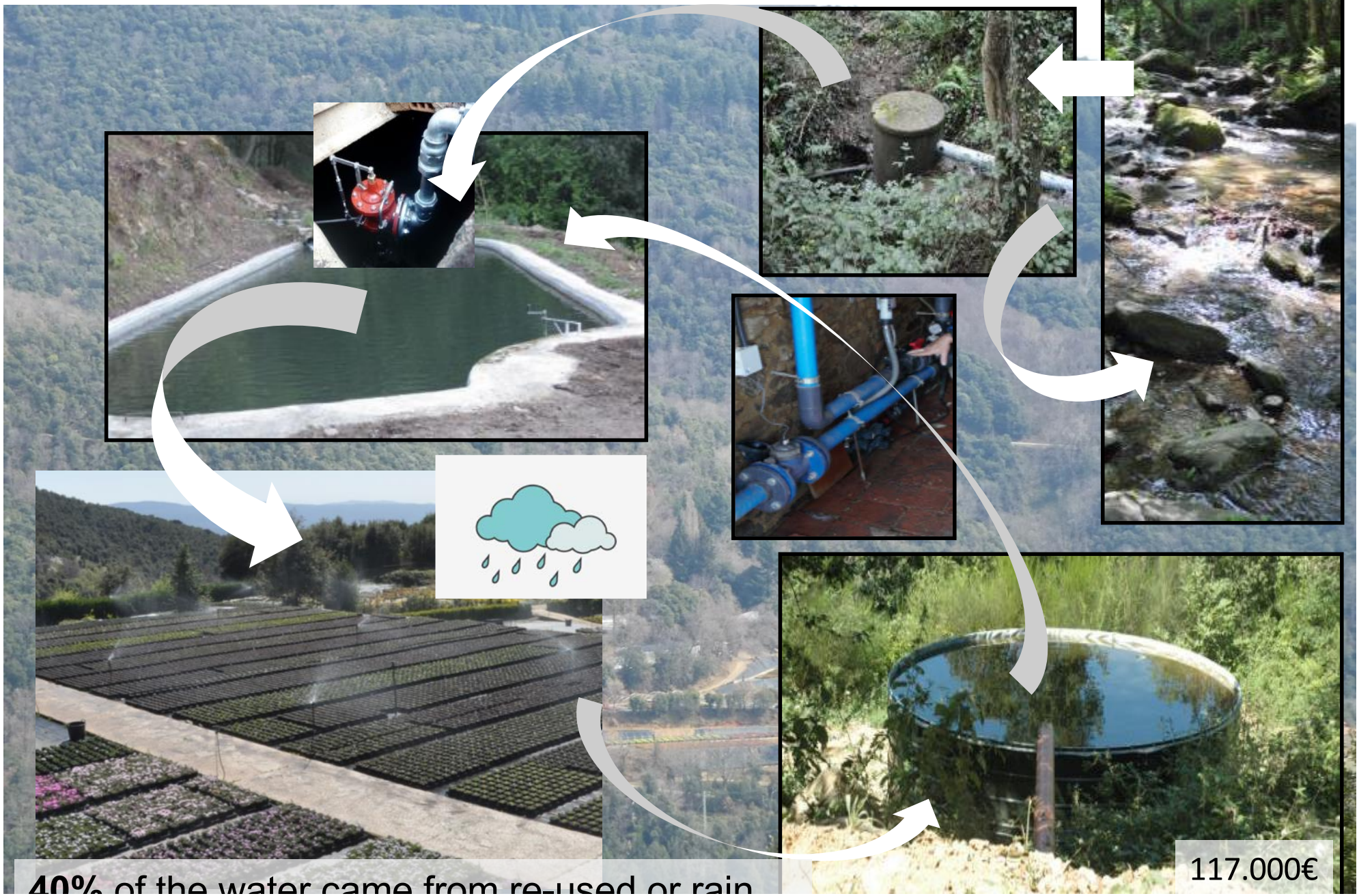


40% of the water came from re-used or rain

117.000€

Wastewater treated prior to discharge

Habitat management

Restoration of riparian forest

Life Tritó Montseny

ISSUES

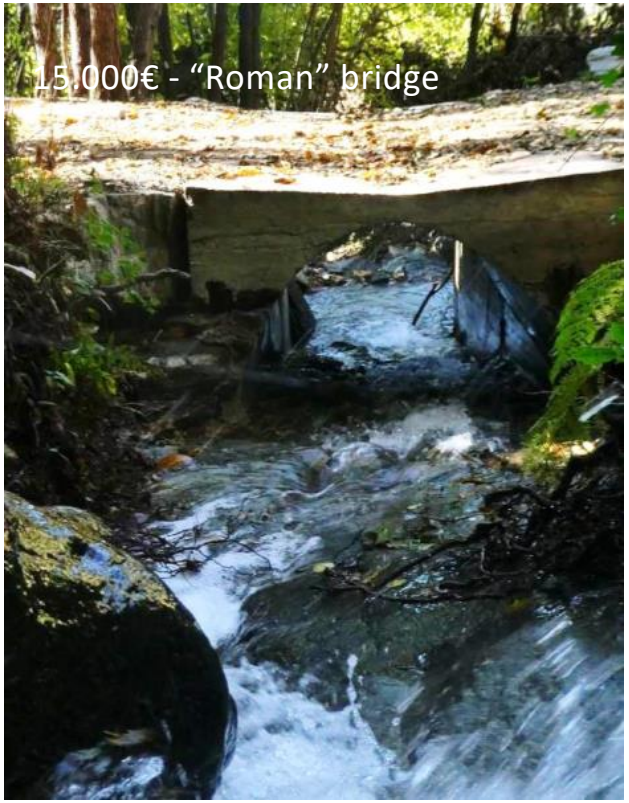
Fragmentation of the habitat
By roads, forest tracks and paths that cross the waterways. They create barriers that the brook newt cannot cross.

Disappearance of riverside forests and replacement of indigenous forest with commercial plantations
The forest's regulatory function is halted: raising temperatures (reducing shade), increased erosion and dragging of sediment into streams.

Habitat management

Restoration riparian forest

Life Tritó Montseny



Restoration riparian forest

Habitat management

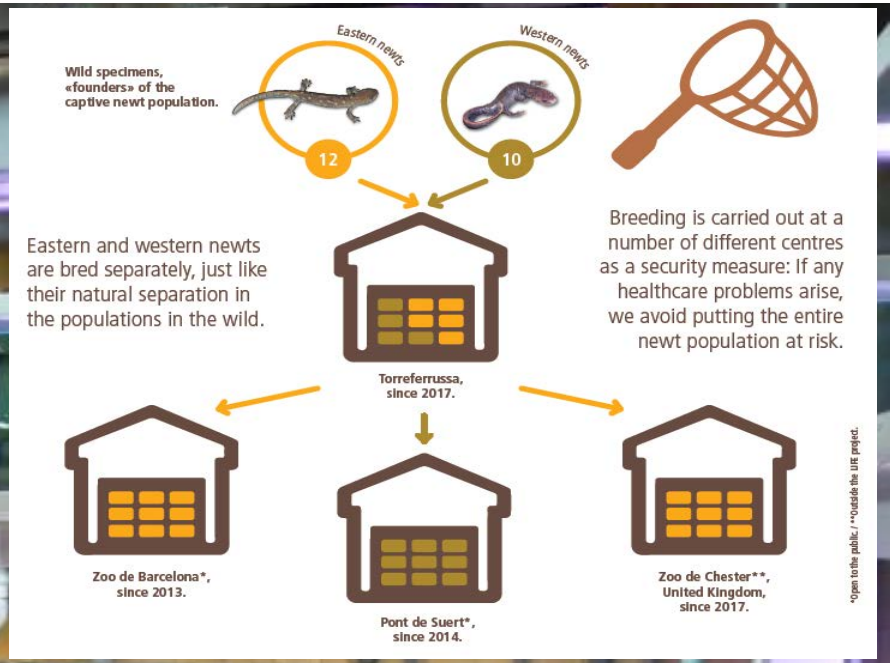
River Connectivity

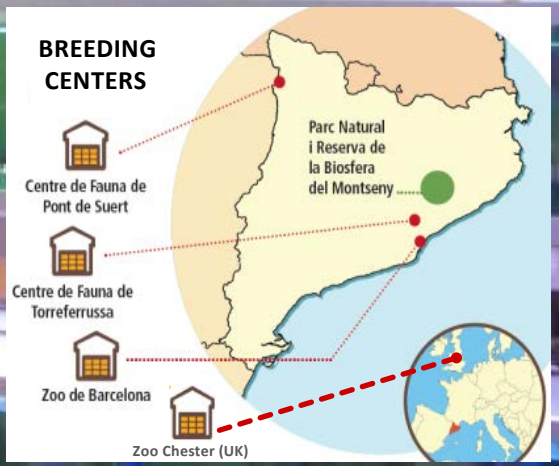
Breeding centers

- 2007: Starting the breeding programme 22 founders (12 Eastern pop & 10 Western pop)

Management ex-situ populations

2007-10





Management ex-situ populations

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PLOS ONE

Integrative Phylogeography of *Calotriton* Newts (Amphibia, Salamandridae), with Special Remarks on the Conservation of the Endangered Montseny Brook Newt (*Calotriton arnoldi*)

Emilio Valbuena-Ureña[1,2*], Fèlix Amat[3], Salvador Carranza[4]

Conservation Genet Resour (2014) 6:263–265
DOI 10.1007/s12686-013-0082-7

TECHNICAL NOTE

Characterization of microsatellite loci markers for the critically endangered Montseny brook newt (*Calotriton arnoldi*)

E. Valbuena-Ureña · S. Steinfartz · S. Carranza

Ecology and Evolution

Open Access

What remains from a 454 run: estimation of success rates of microsatellite loci development in selected newt species (*Calotriton asper, Lissotriton helveticus*, and *Triturus cristatus*) and comparison with Illumina-based approaches

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Heredity (2017) 118, 424–435
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ORIGINAL ARTICLE

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E Valbuena-Ureña[1,2], A Soler-Membrives[1], S Steinfartz[3], P Orozco-terWengel[4] and S Carranza[5]

PeerJ

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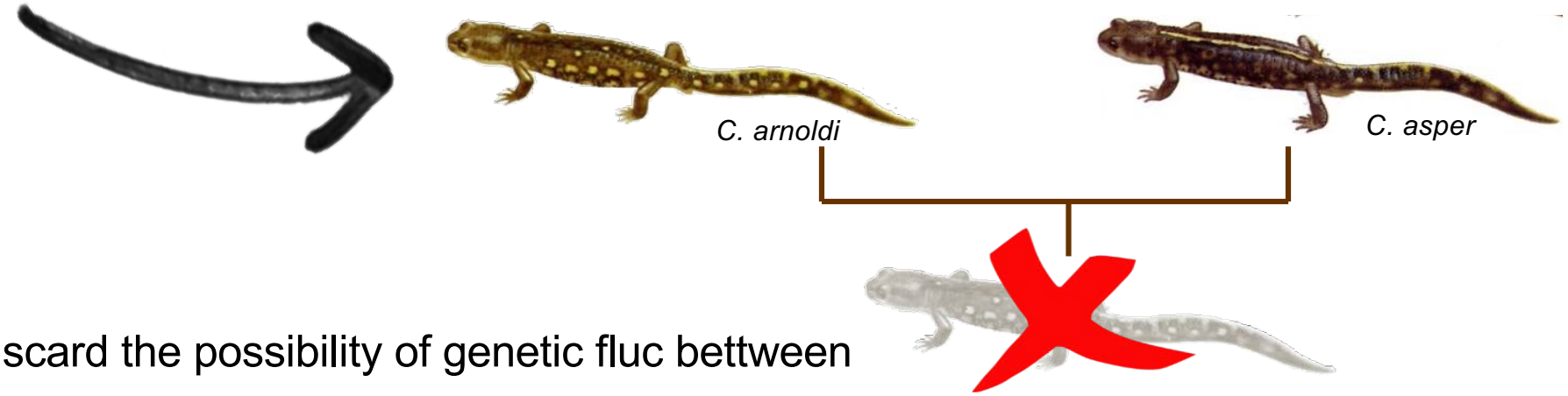

Discard the possibility of genetic fluc bettween both species of the genus *Calotriton*

Management ex-situ populations

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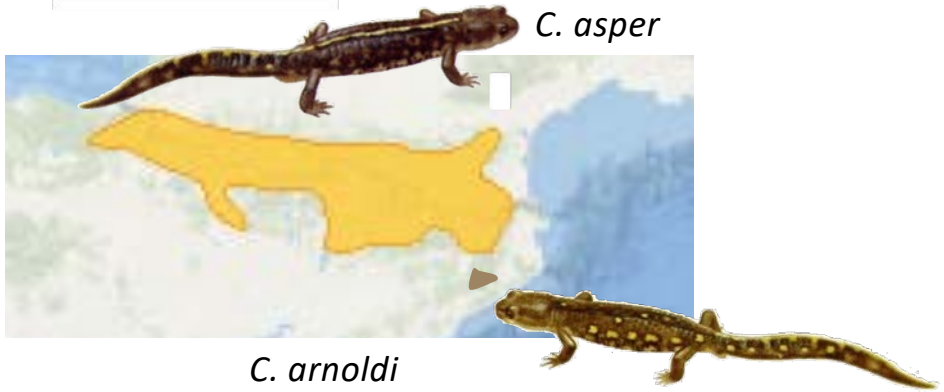

High genetic diversity compared with other urodels with wider range of distribution

Management ex-situ populations

Life Tritó Montseny

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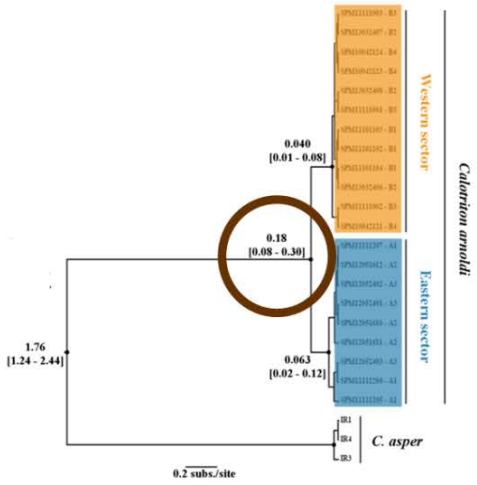

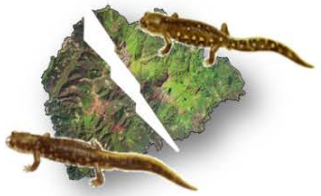

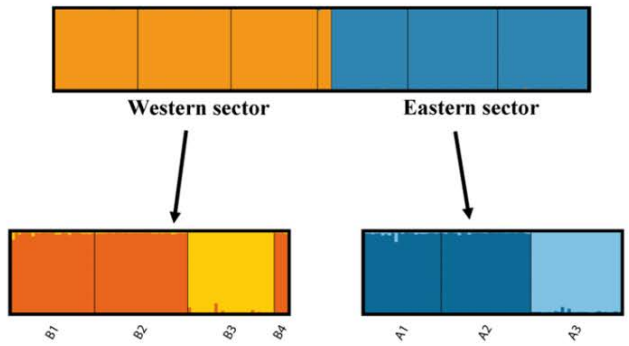

High genetic structure and significant differences between two populations

Absence of genetic flux between both populations

Management ex-situ populations

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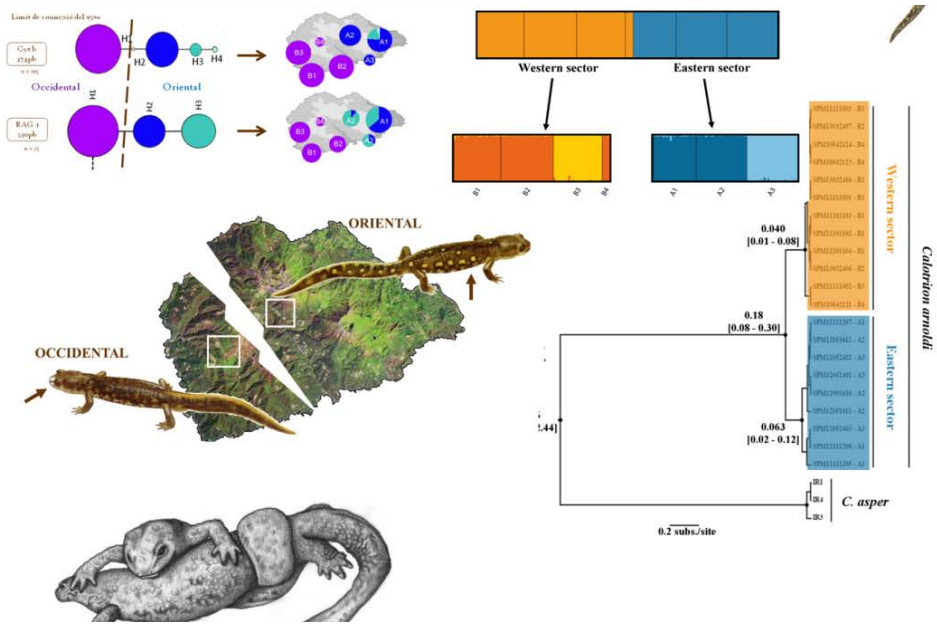


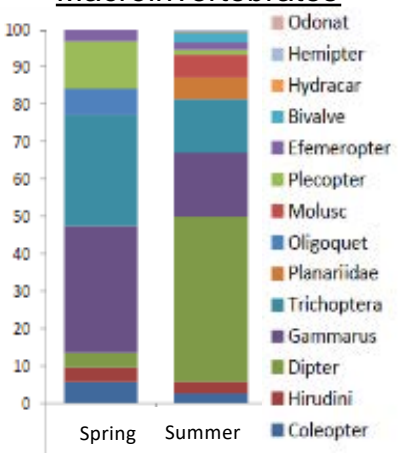
Identify the Evolutive Significant Units (ESU) to preserve → Oriental / Occidental

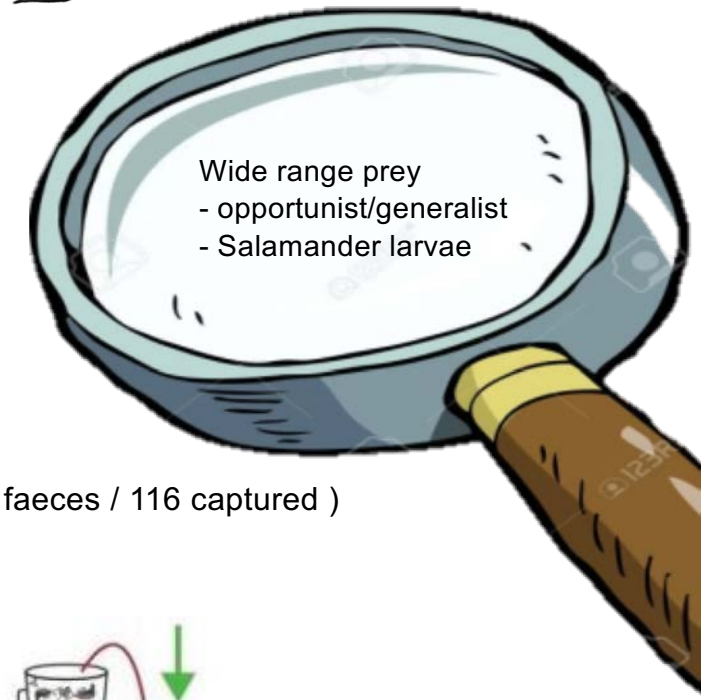
Research
& Monitoring

Diet in field

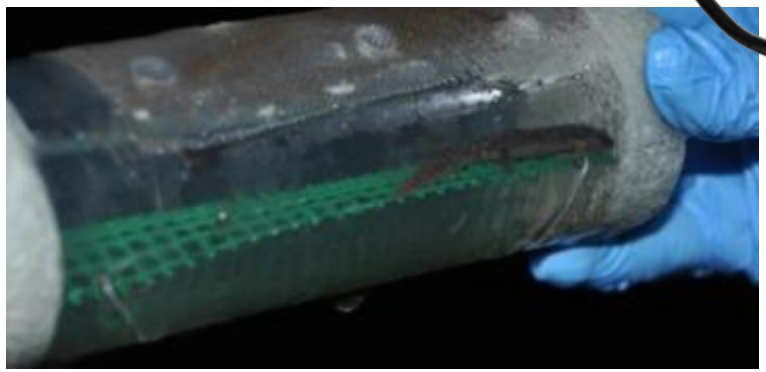
Life Tritó Montseny

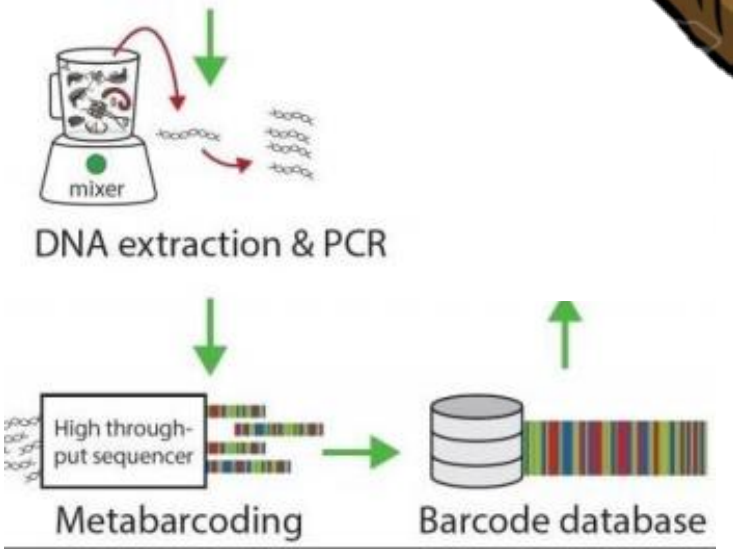
Macroinvertebrates





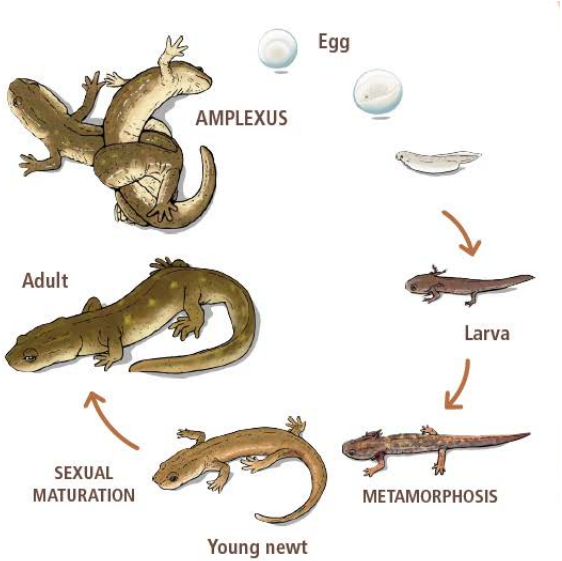
(40 faeces / 116 captured)



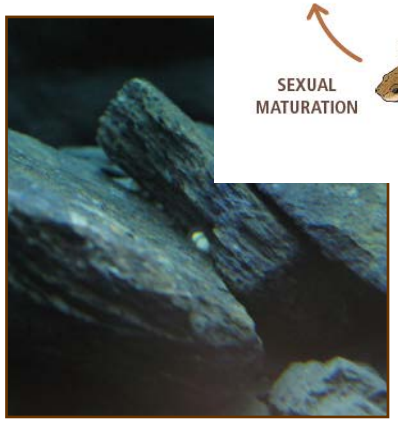


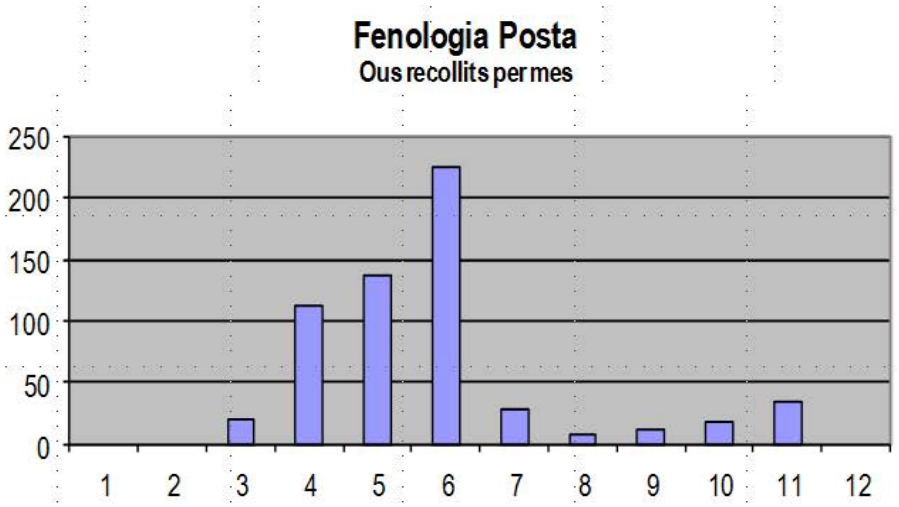
Management ex-situ populations

- Amplexus all year (high spring time)
- Eggs 5 mm diameter
- Clutches 60 eggs / female (max 150)
- Development at 12 ºC / 40-50 days
- Metamorphosis 6 to 24 months
- Sexual maturity 4-5 years (males a bit longer)



	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
TEMPERATURE	6 C	8 C	10 C	12 C	14 C	16 C	17 C	18 C	16 C	13 C	10 C	8 C
WATER LEVEL	Increase	Maximum	Decrease	Decrease	Decrease	Decrease	Decrease	Lowest	Increase	Increase	Increase	Increase





Conservation
(in-situ & ex-situ)

Breeding program : Production for releases

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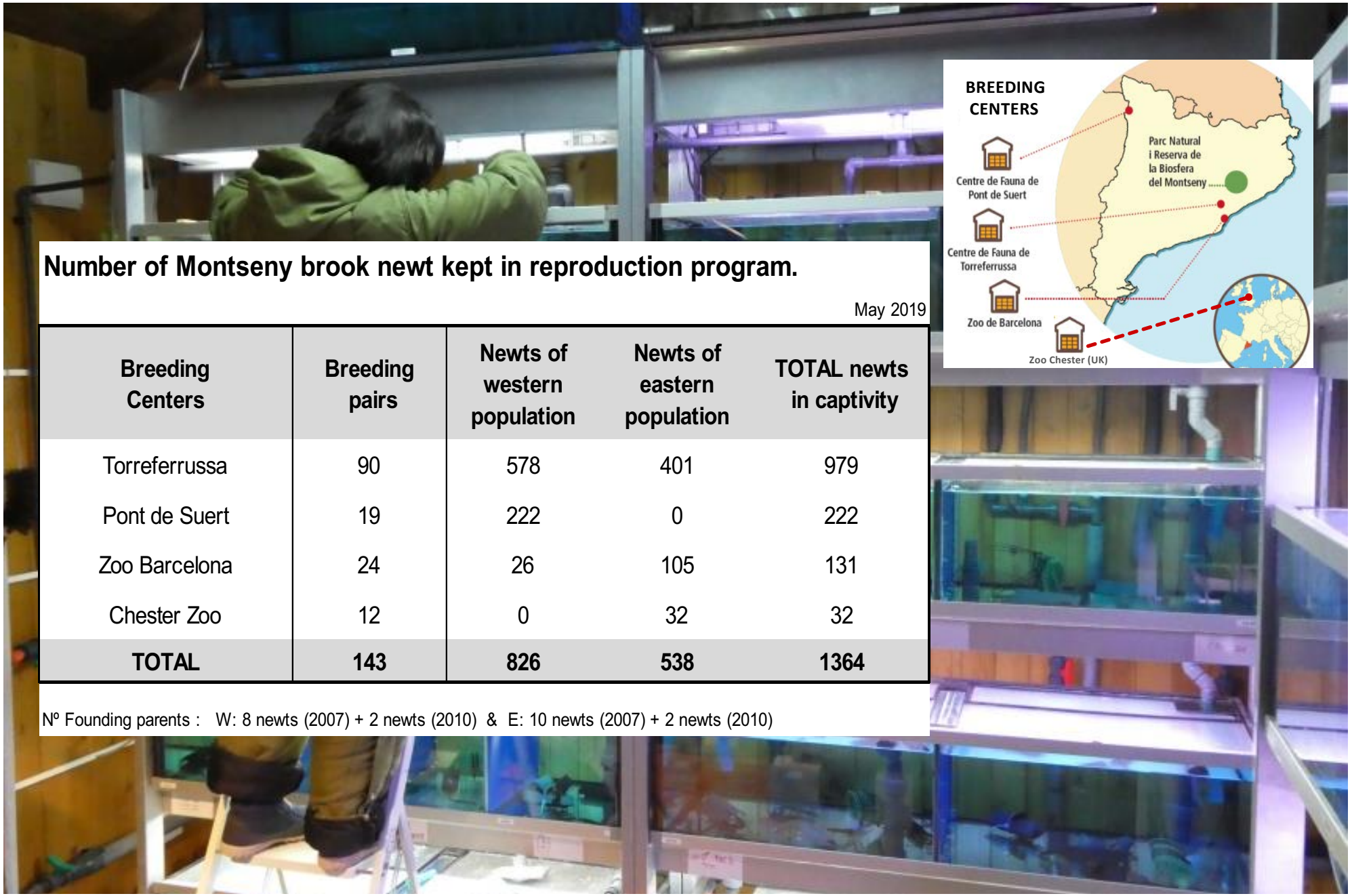


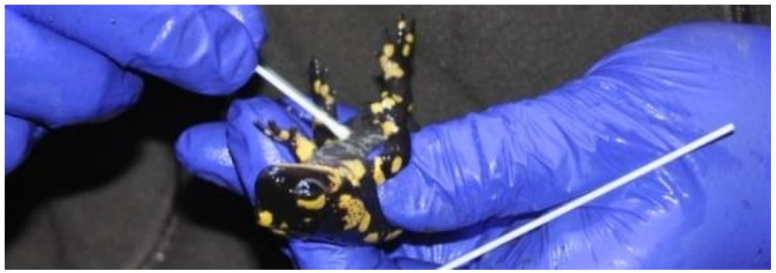
Number of Montseny brook newt kept in reproduction program.

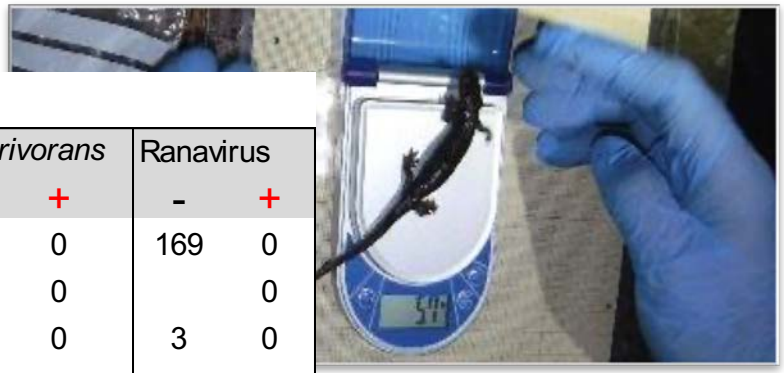
May 2019

Breeding Centers	Breeding pairs	Newts of western population	Newts of eastern population	TOTAL newts in captivity
Torreferrussa	90	578	401	979
Pont de Suert	19	222	0	222
Zoo Barcelona	24	26	105	131
Chester Zoo	12	0	32	32
TOTAL	**143**	**826**	**538**	**1364**

Nº Founding parents : W: 8 newts (2007) + 2 newts (2010) & E: 10 newts (2007) + 2 newts (2010)

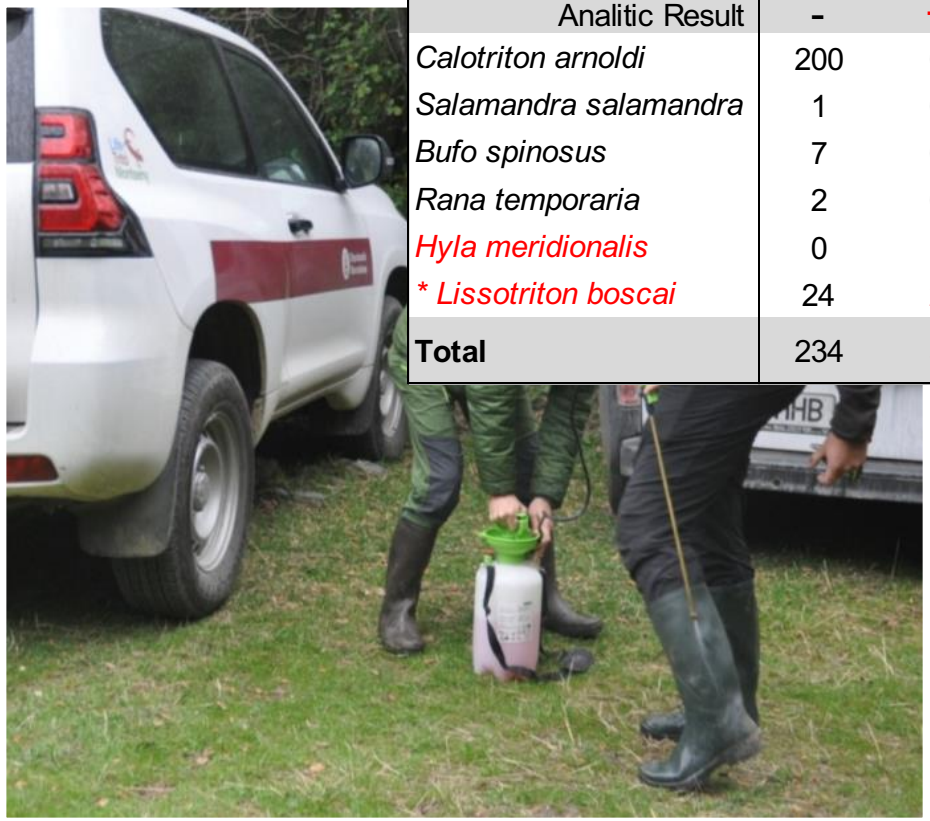
Pre-release surveys (pathogens)





Infectious disease

	B.dendrobatidis		*B.salamandrivorans*		Ranavirus	
Analitic Result	-	+	-	+	-	+
Calotriton arnoldi	200	0	200	0	169	0
Salamandra salamandra	1	0	1	0		0
Bufo spinosus	7	0	7	0	3	0
Rana temporaria	2	0	2	0		0
Hyla meridionalis	0	1	1	0	1	0
* *Lissotriton boscai*	24	2	26	0	26	0
Total	234	3	237	0	199	0



Conservation
(in-situ & ex-situ)

Reintroductions 2010-14

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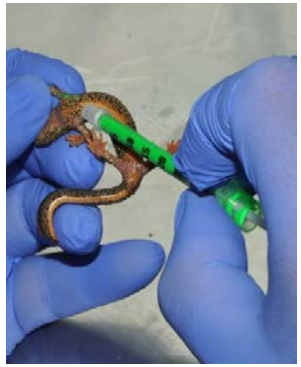


New Population	Total number released	Ages (years)	Release years	Survival	Breeding Success
West 1	390	1-3	2010,11, 12,14	>20%	YES
West 2	106	0-1	2014,15	YES	?
West 3	136	4-9	2019	YES	?
East 1	166	2-4	2011,14	2017 -19?	Amplexus seen 2016
East 2	62	0-1	2014,15	YES?	?

- One of five reintroduced populations has been successful
- The survivorship of this population >20% of the released individuals
- Run out of future “obvious” release sites
- New populations can be created IF :
  - habitat conditions are optimal
  - repeated releases of newts were done
- Atmosphere of incertitude / failure

Life Tritó Montseny

Ex situ

- Ex-situ conservation program started in 2007
- Low survival rate from eggs in captivity, slow growth and sexual maturity after 6 years
- Sperm storage (implications for studbook management)
- Good studbook management (>12 years)
- Good individual identification (VIE and microchips)

In situ

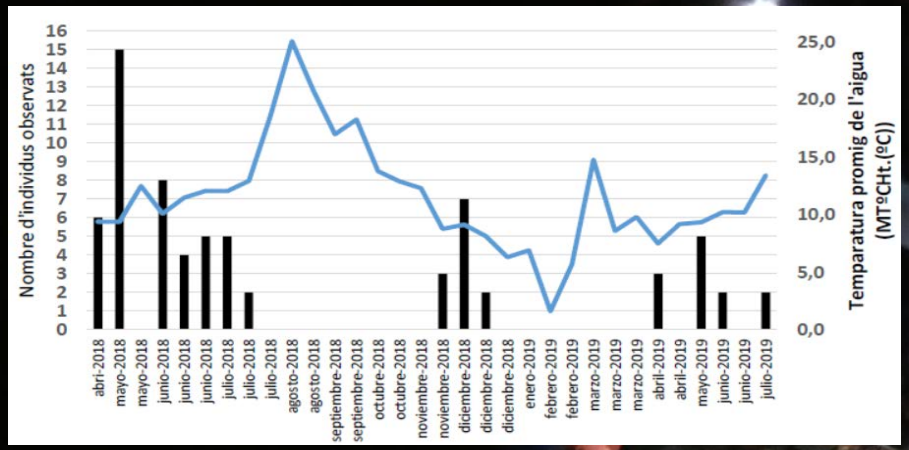
- First tests for the establishment of new populations during 2010-2014
- Good individual identification (VIE)
- Only one new population successfully established, but strong limitations to assess its viability
- Unsuccessful establishment of new populations in apparently suitable streams

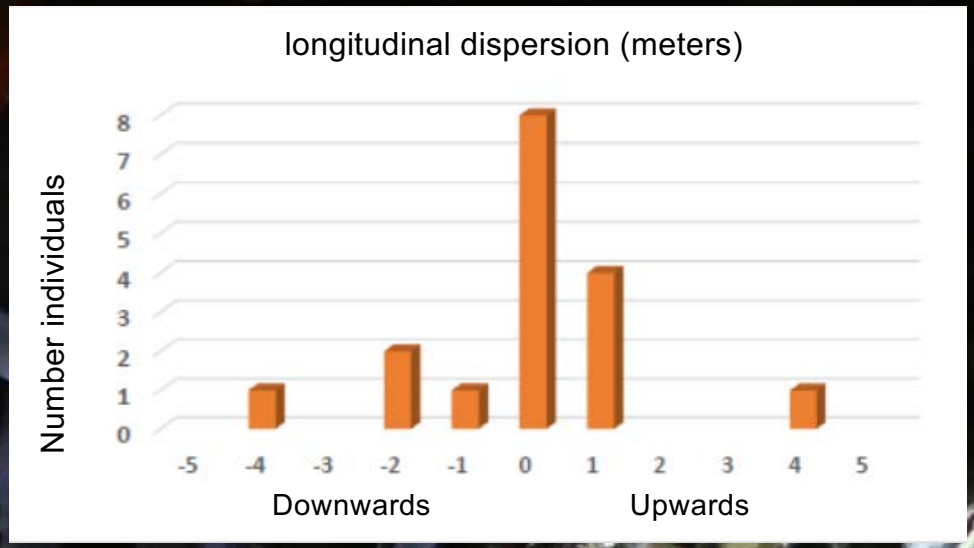
Research & Monitoring

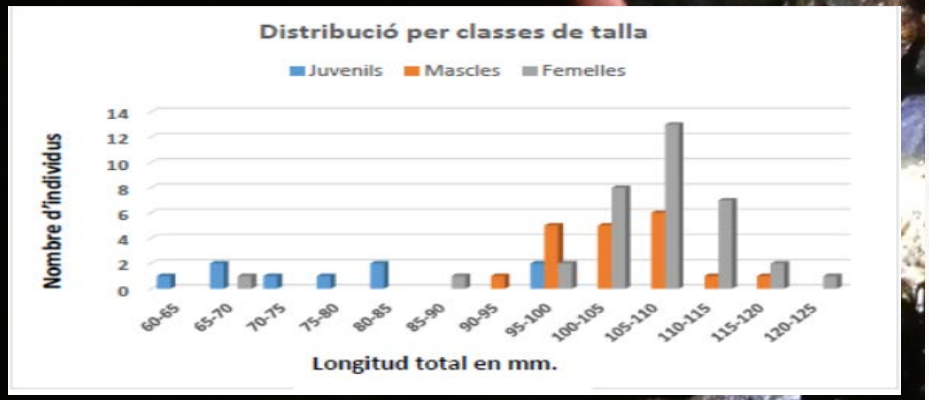
First results from the releases

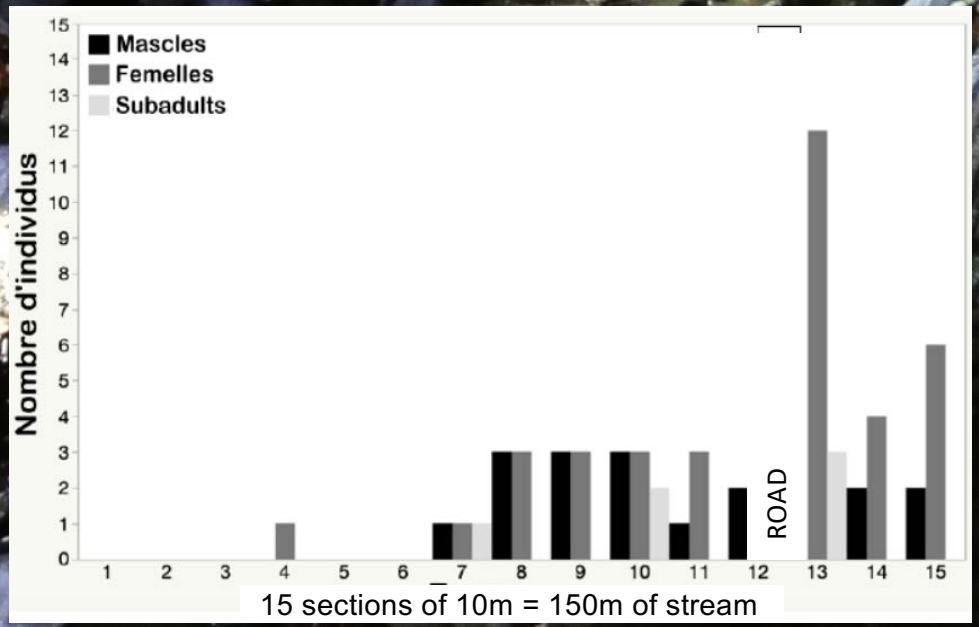
Life Tritó Montseny

D.Fernandez, A.Montori, F.Amat; 2019







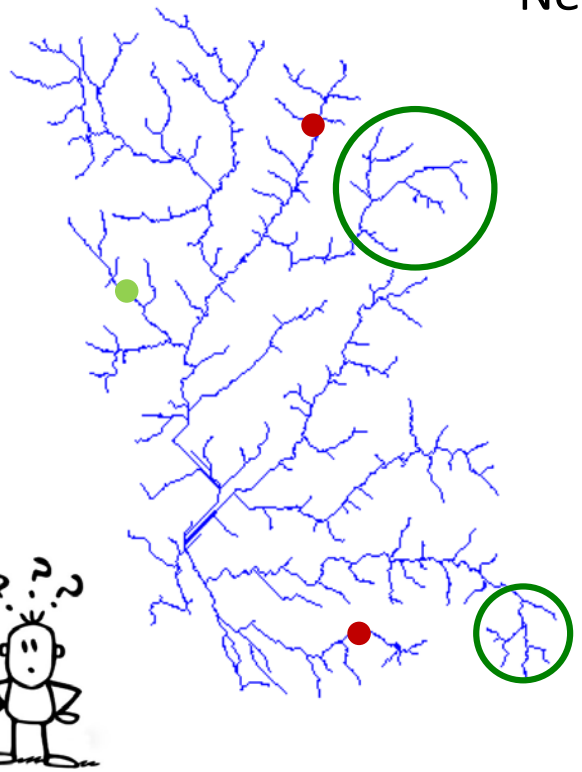


Challenges for systematic planning

- Deal with **critical uncertainties** in the decision making framework
- Add known **stochastic features** in optimization analyses
- Accept **common objectives** on **different timing** need to work in **parallel**
- Encourage an **adaptive management approach** to reduce uncertainty on the basis of learning experiences
- **Review** and **monitoring**
- **Try, fail, learn and start again**
  - Don’t fear to try if it is science based
  - Don’t leave it for tomorrow with ex situ populations

Lessons learnt creating new wild populations

Needs a structured planning to identify new release sites.



- Systematic planning of new populations
- Built in a **structured decision making** framework
- Involve key stakeholders to better frame **specific objectives** for the creation of new populations
- Identify **new potential sites** through SDM and expert knowledge and subsequent field validation
- Build **population models** based on expert assessments
- Integrate all in an **optimisation analysis** to identify the better solution for the new populations
- Set up a strong basis to **learn** good things to improve species status

Next lines to continue supporting the reintroductions

Defining objectives for the new populations

Where should the new populations be?

What habitat features should they have?

How should the new populations be?

Optimisation the creation of new wild populations

Rank new sites according to land ownership and owners willingness to establish custody agreements

Prioritise sites with similar conditions to those of natural populations (riparian forests, geomorphology and presence of water), and preferably difficult to access

Test new sites with different conditions

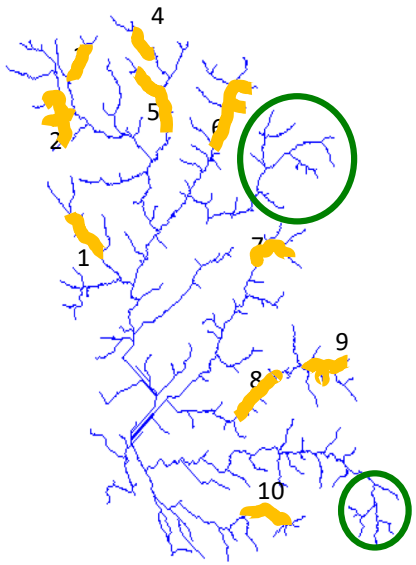
Use captive breeding stocks to size up the number of new populations

Water catchments and forest management are main actual threats

Evaluate performance in 10-15 years

Next lines to continue supporting the reintroductions

Identifying new potential sites



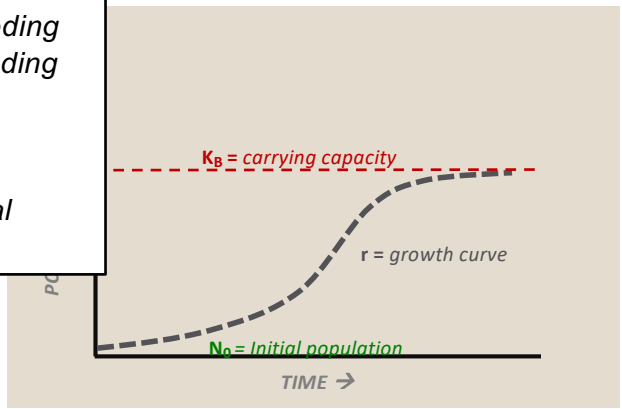
Length of the stream
Types of riverine forest
Water availability
Geomorphology
Accessibility
Land ownership
Forest management
Water catchments
Presence of fish
Restoration costs

- **Modelling habitat suitability** to identify new potential sites

Building the population model

- **Key parameters population model to**
  - Define ex-situ population stocks (Eastern & Western)
  - Estimate carrying capacity for the new identified locations
  - Determine parameters grow curve

Age at first breeding
Age at last breeding
Larval survival
Clutch size
Sex ratio
Juvenile survival
Adult survival



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Parc Natural del Montseny
Reserva de la Biosfera

Thanks a lot for your attention!

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