

# Finding Sites for LIFE-Saving Projects Against Climate Change for European Herpetofauna

Agustín Camacho

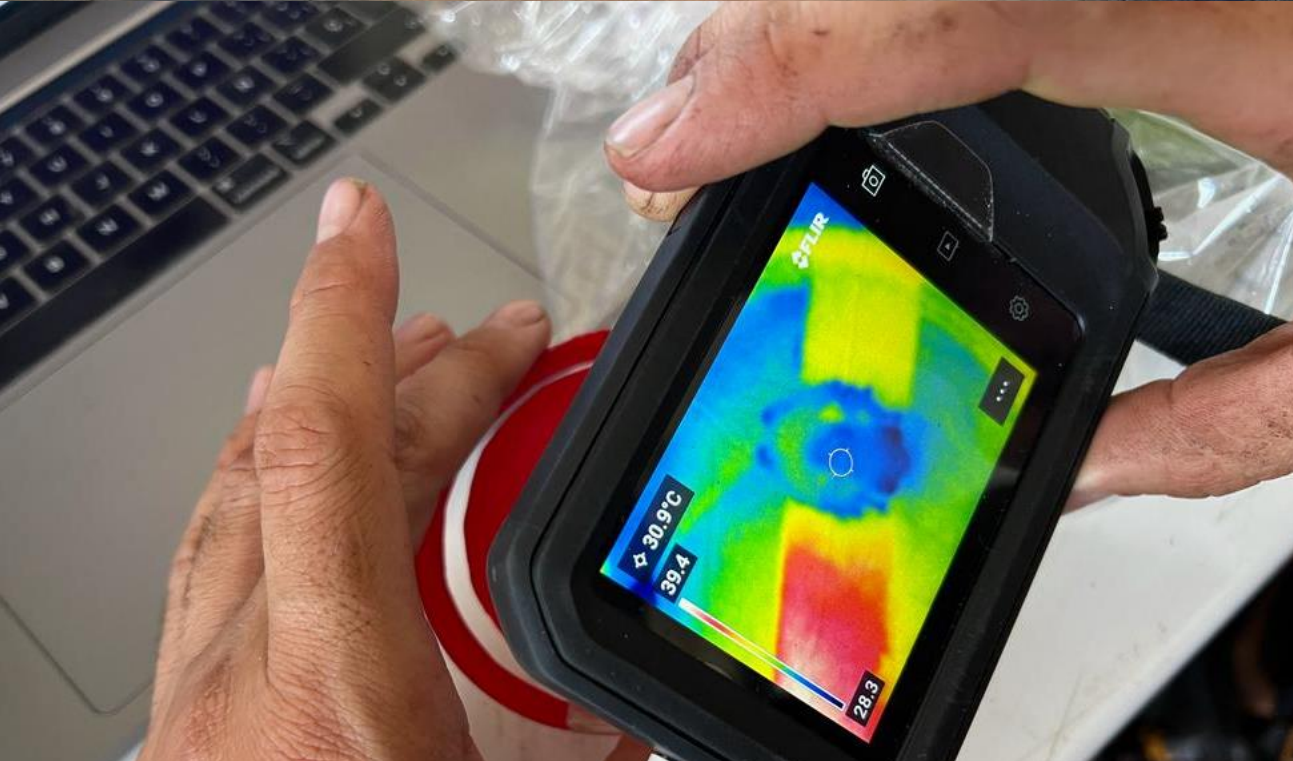


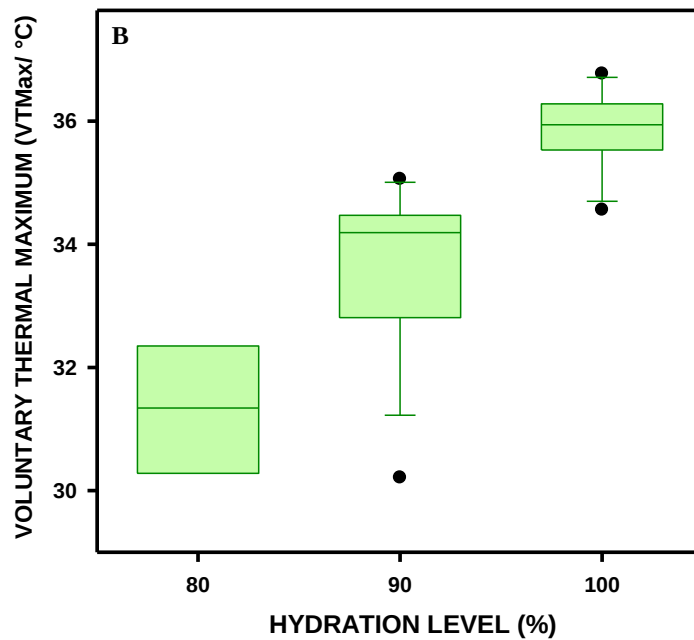
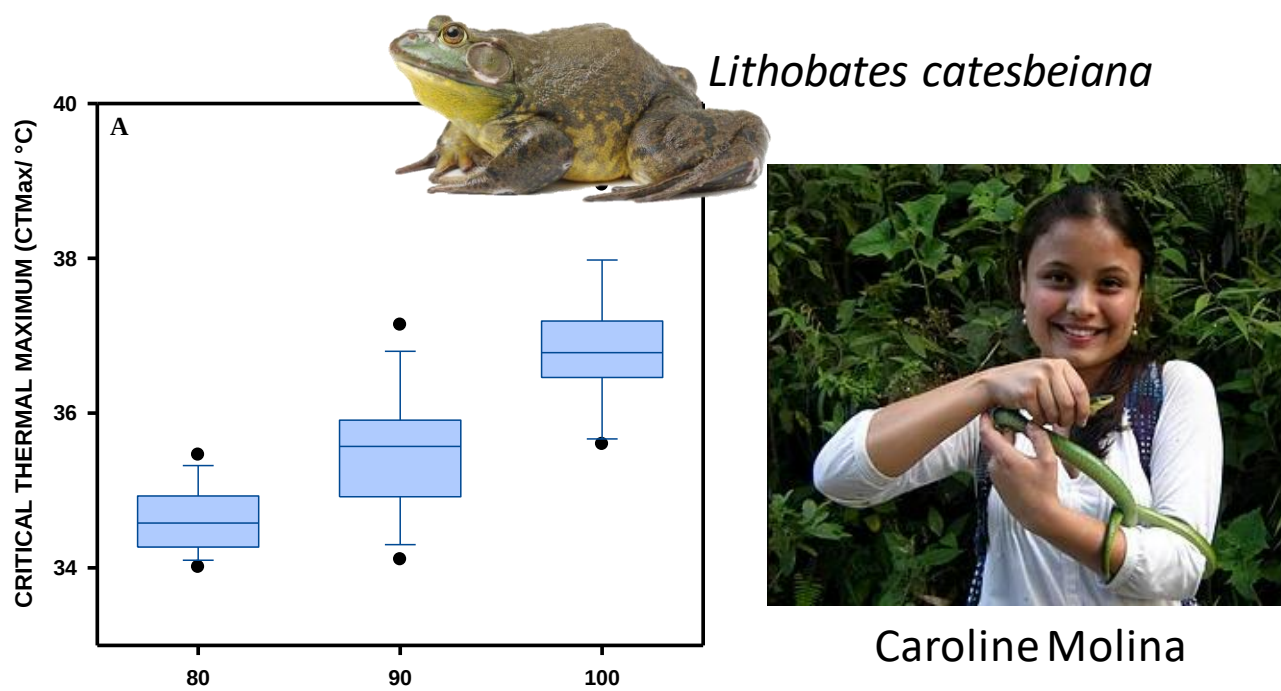
VulneraWeb







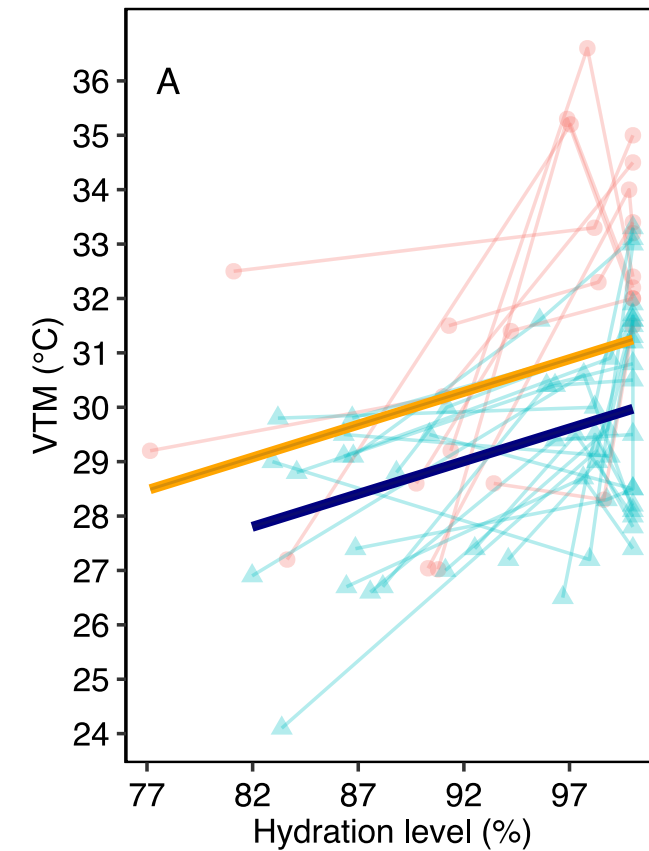




Molina-Guevara et al., 2018 J. Therm. Biol.



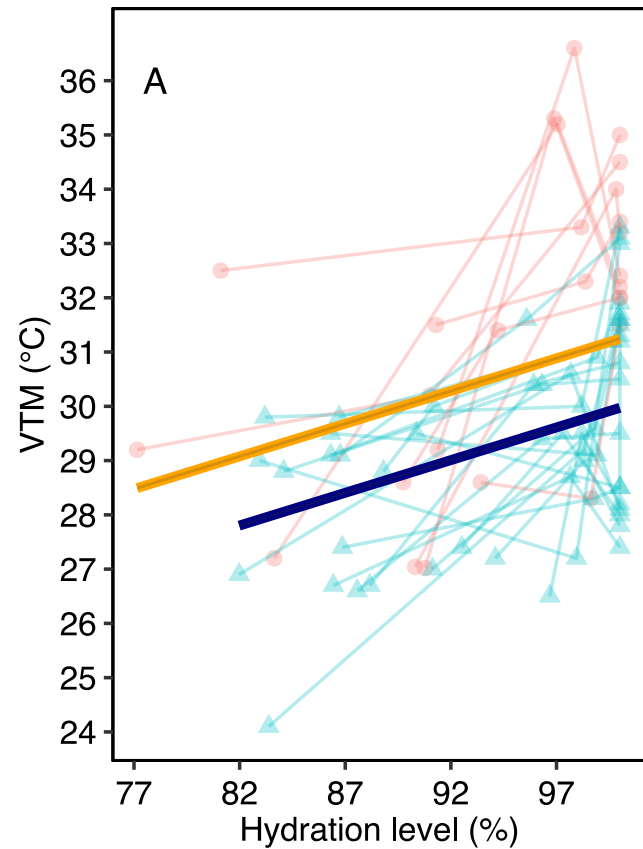
*Loxopholis ferreirai* and *L. percarinatum*



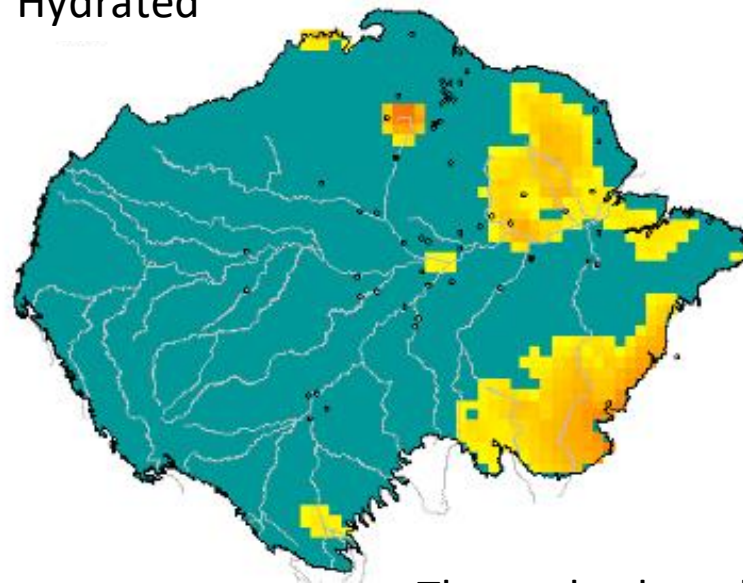
Camacho et al., Plos One 2023



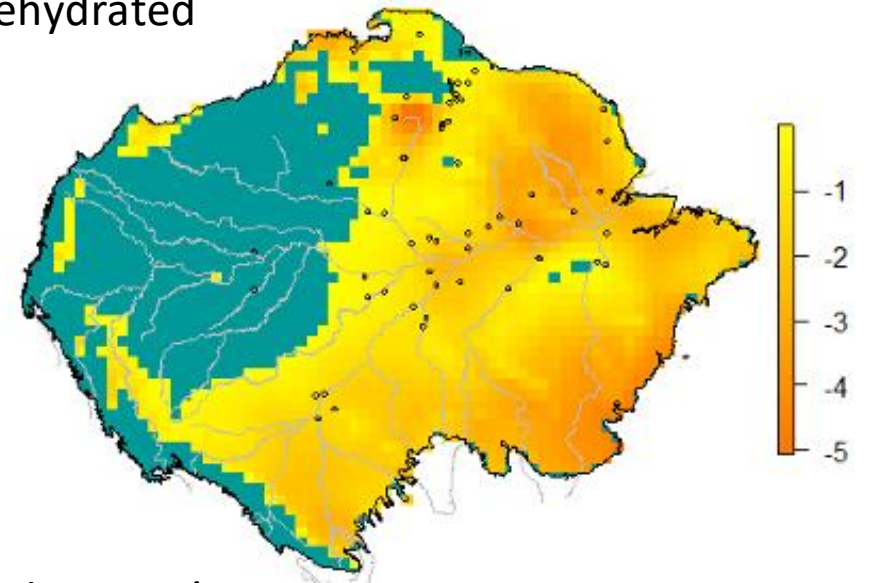
*Loxopholis ferreirai* and *L. percarinatum*



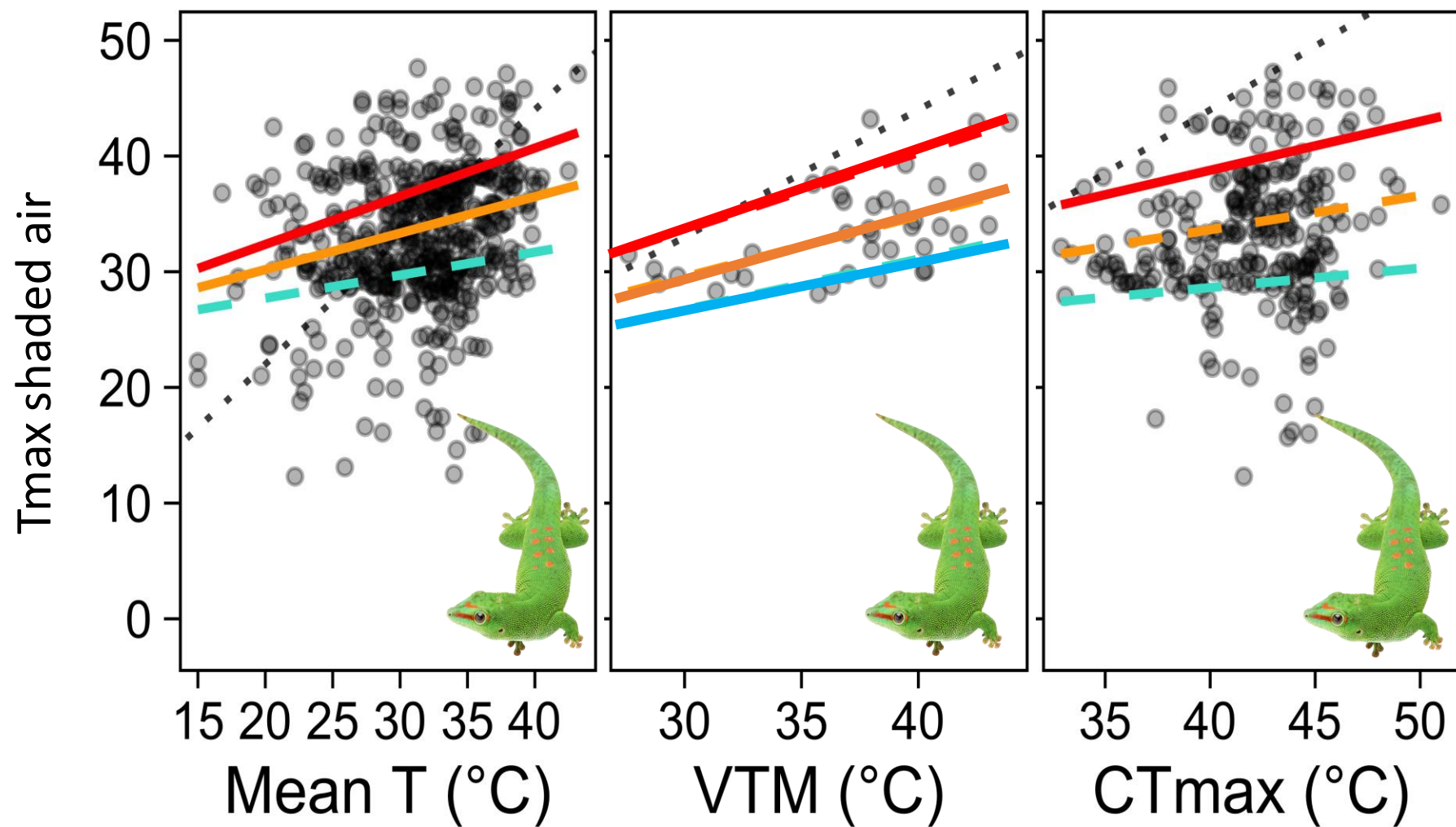
Hydrated

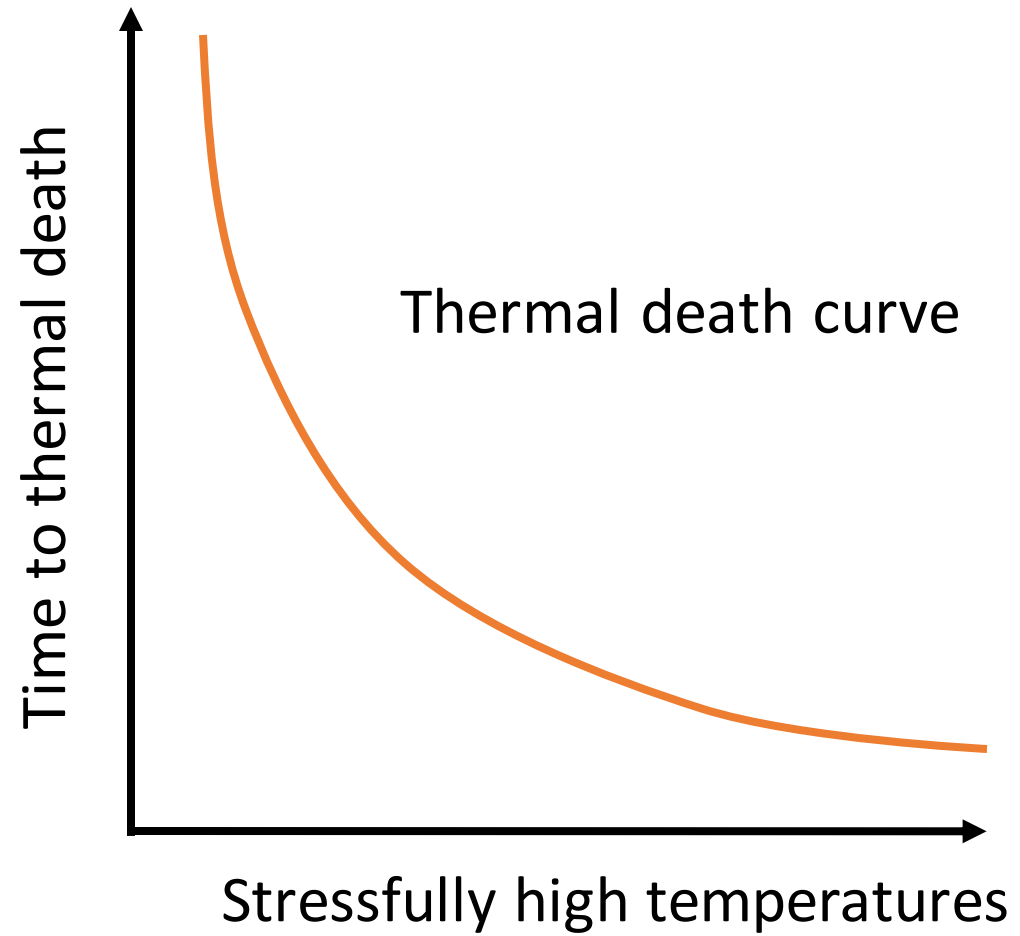


Dehydrated

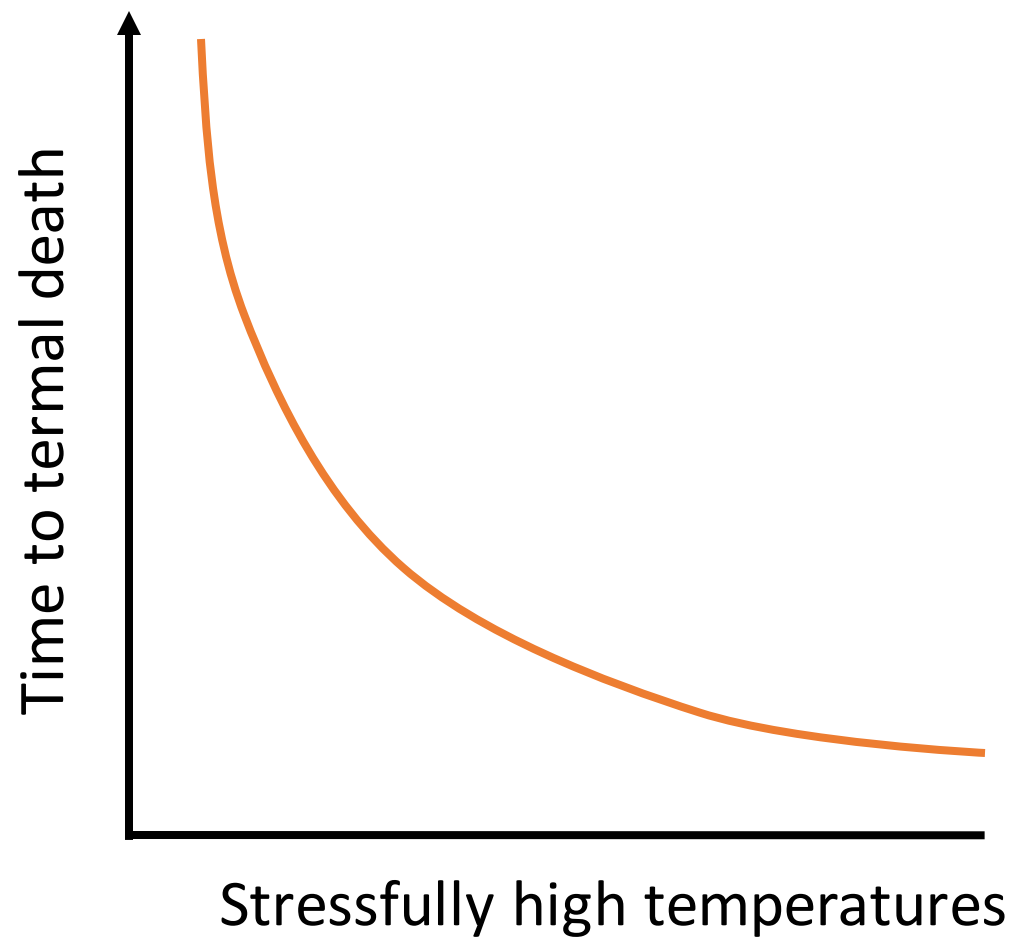


Thermal vulnerability for *L. percarinatum*  
across the amazon basin

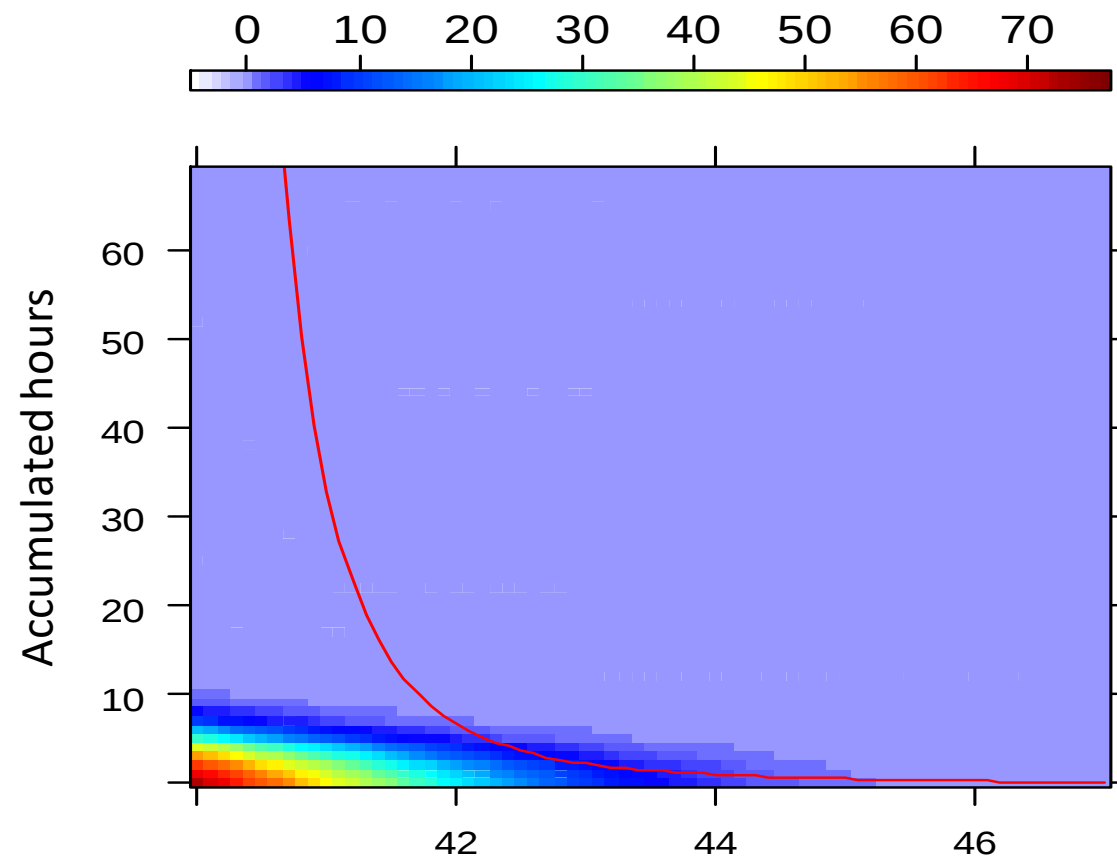




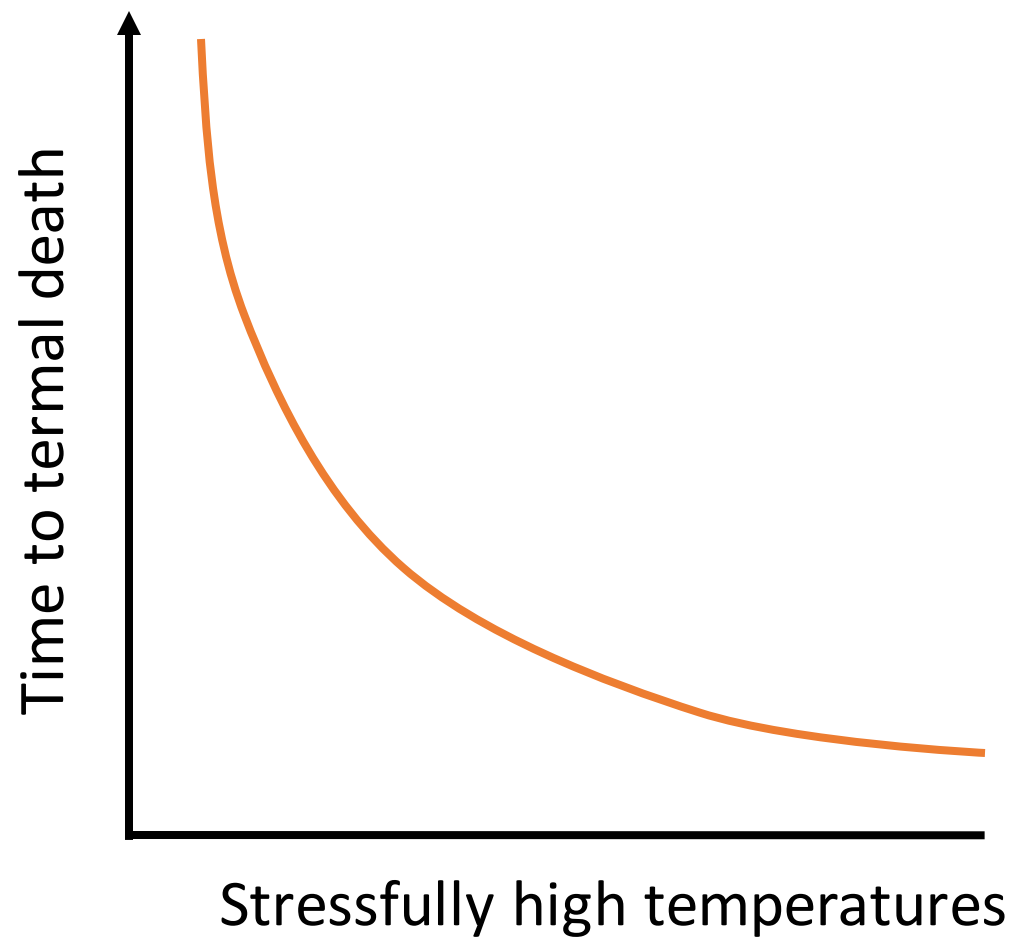
Mod. from Rezende et al., 2015. *Func. Ecol.*



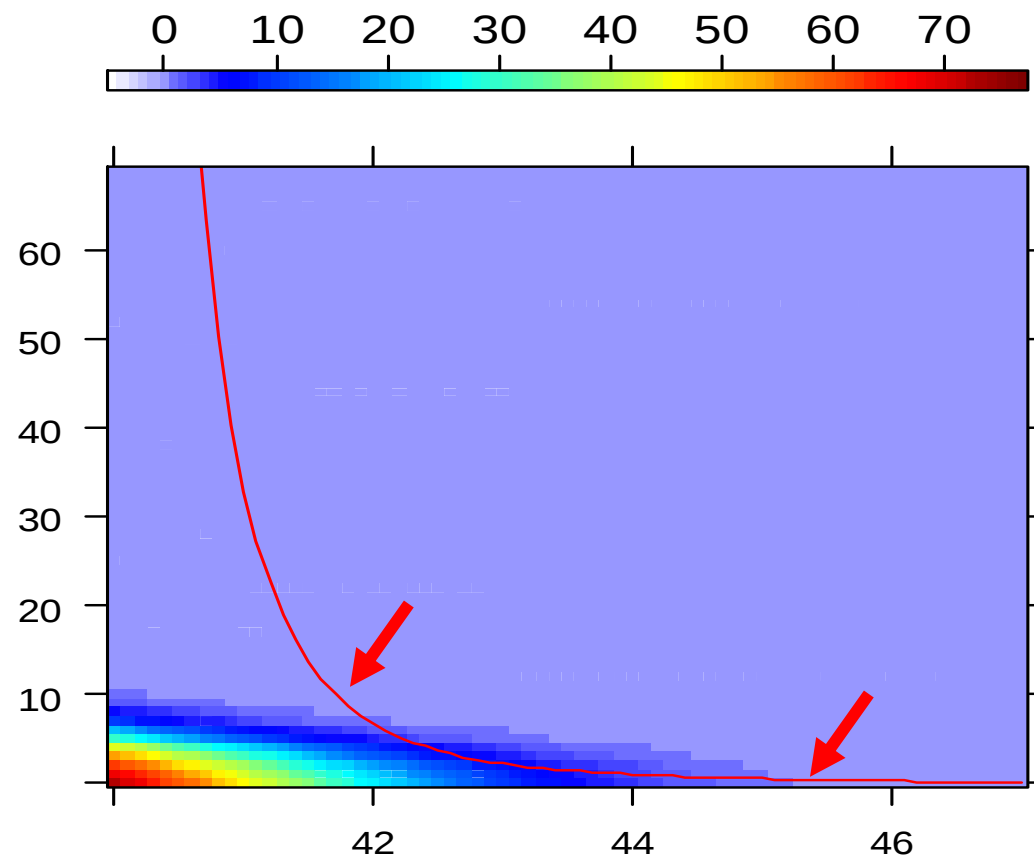
Mod. from Rezende et al., 2015. *Func. Ecol.*



Mod. From Camacho , Angilletta & Levy, 2016.

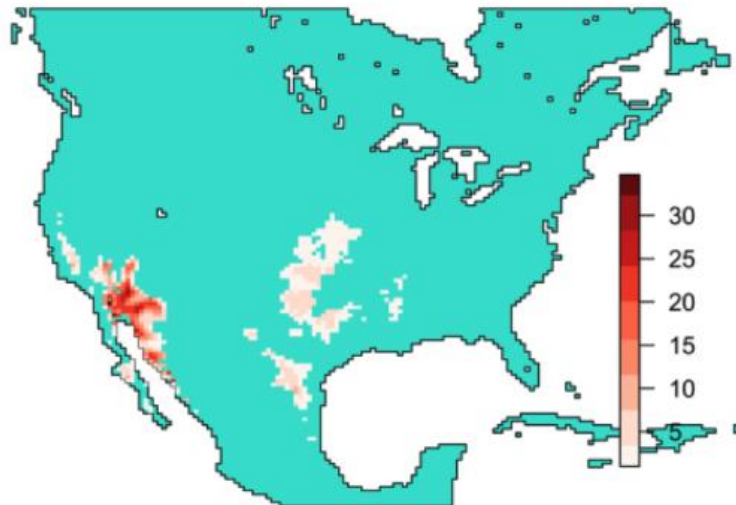


Mod. from Rezende et al., 2015. *Func. Ecol.*

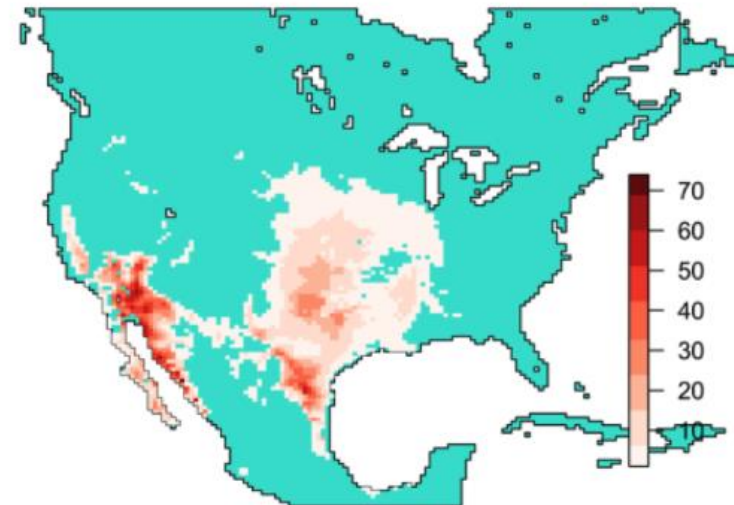


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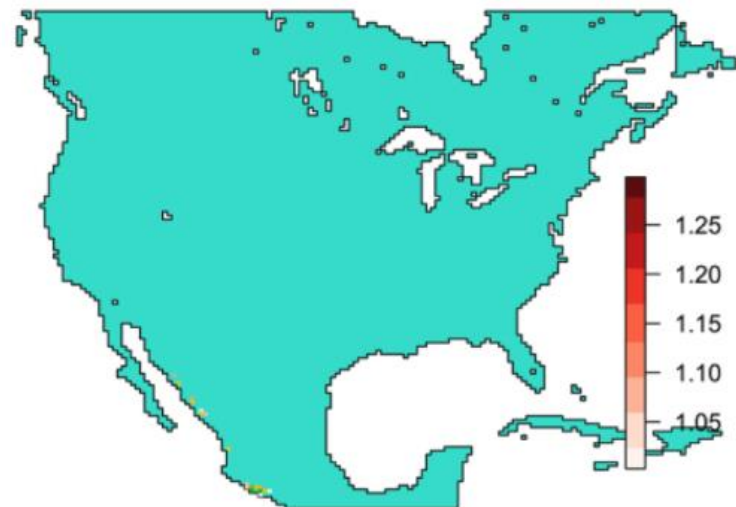
a) CTmax



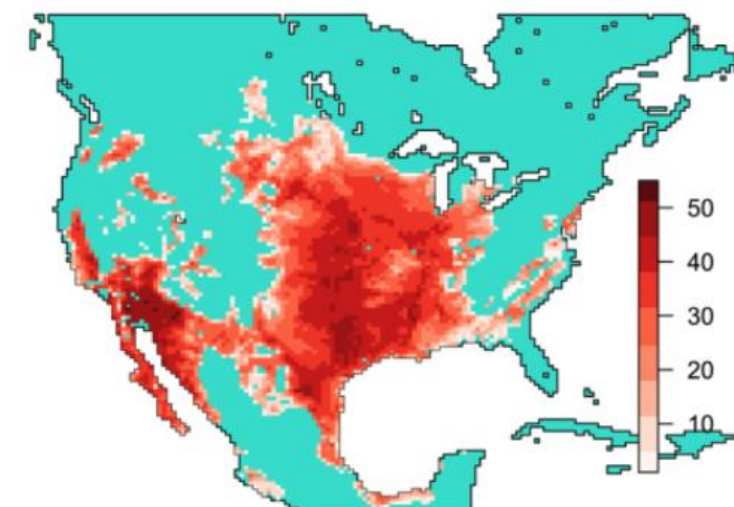
b) VTM



c) PBT



d) TDC





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VulneraWeb

# Identification of populations under climatic risk



Córdoba' City Hall Environmental Council, April 2023.

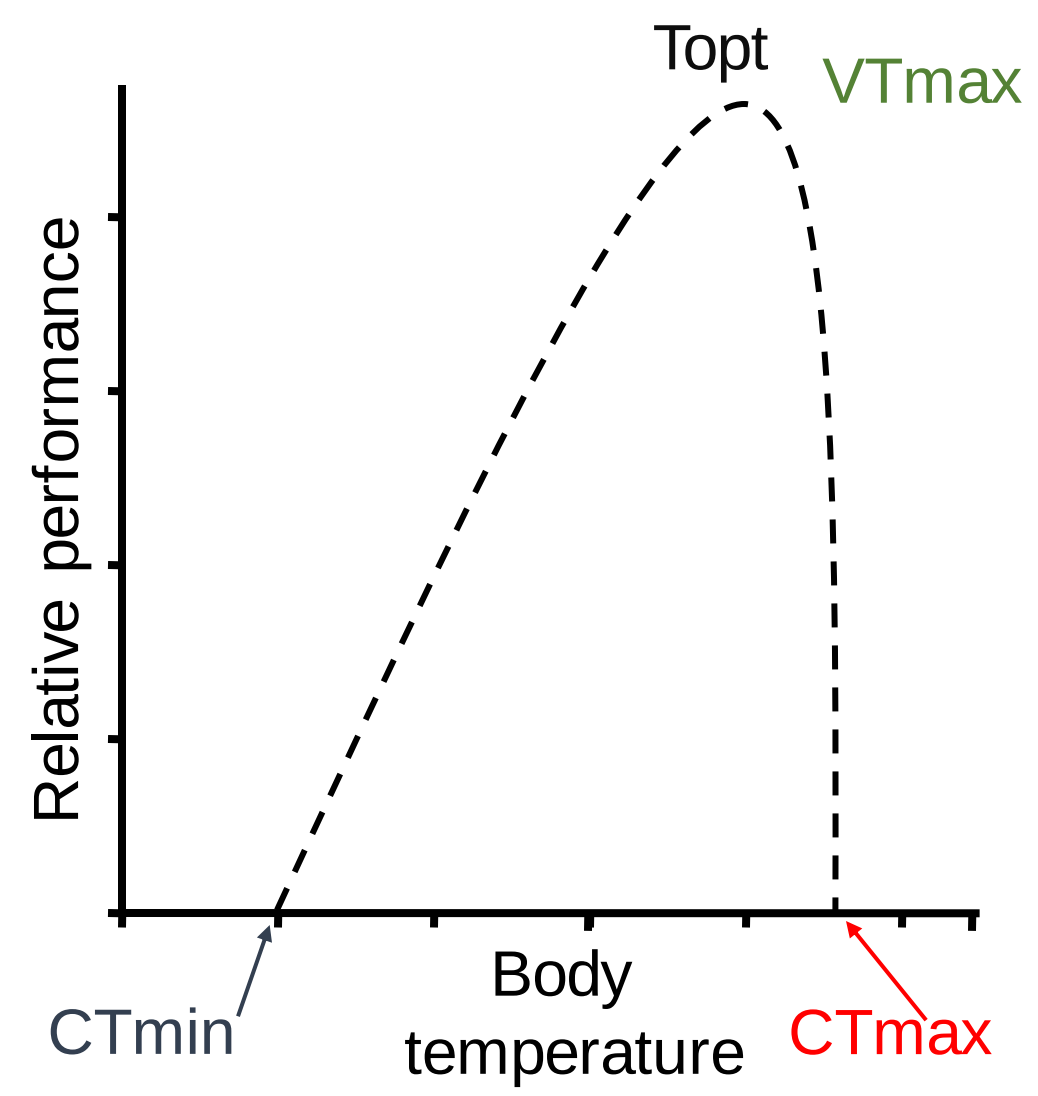
Sensitivity

Population's  
Climatic  
Vulnerability

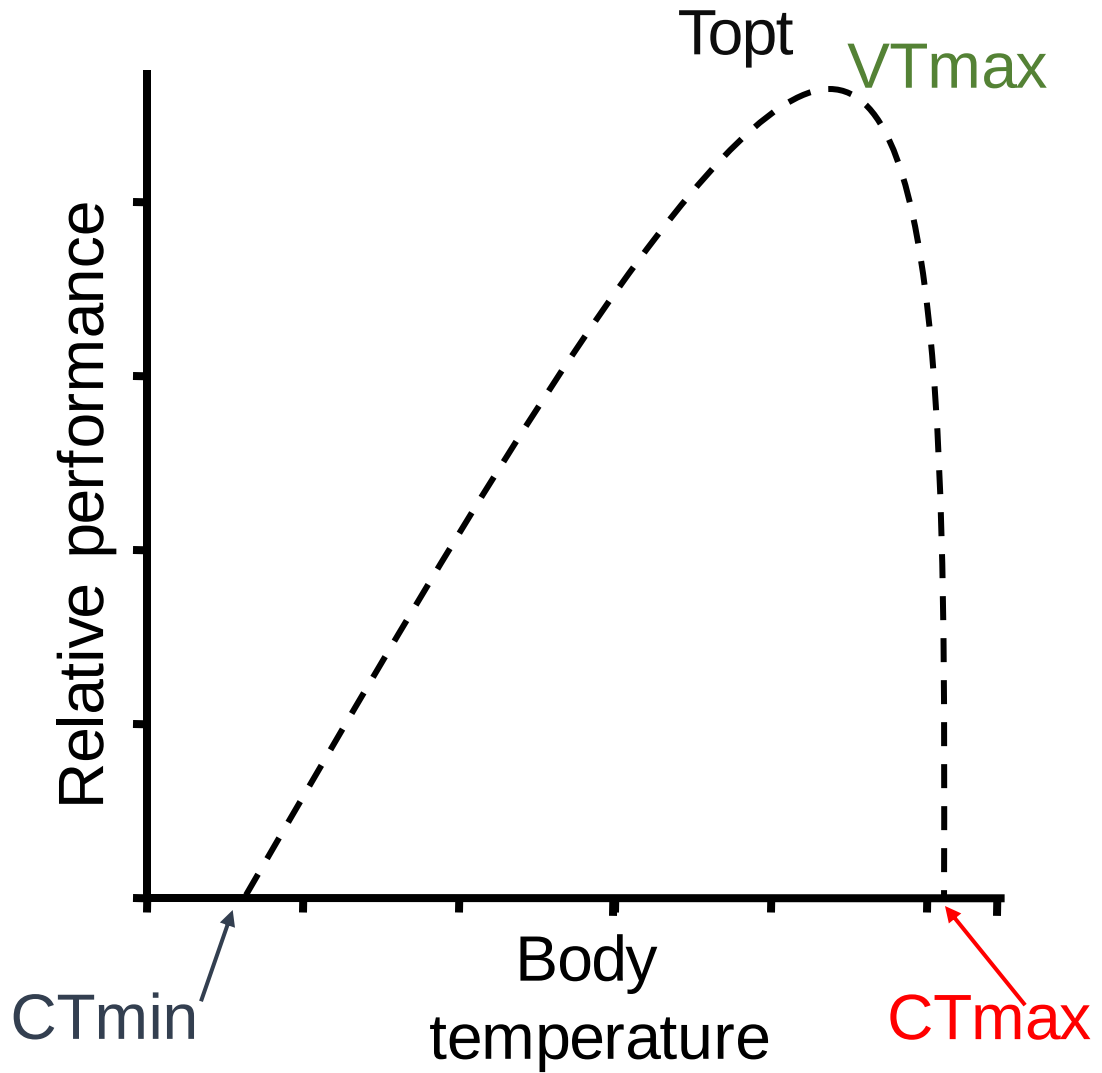
Exposure

Adaptability

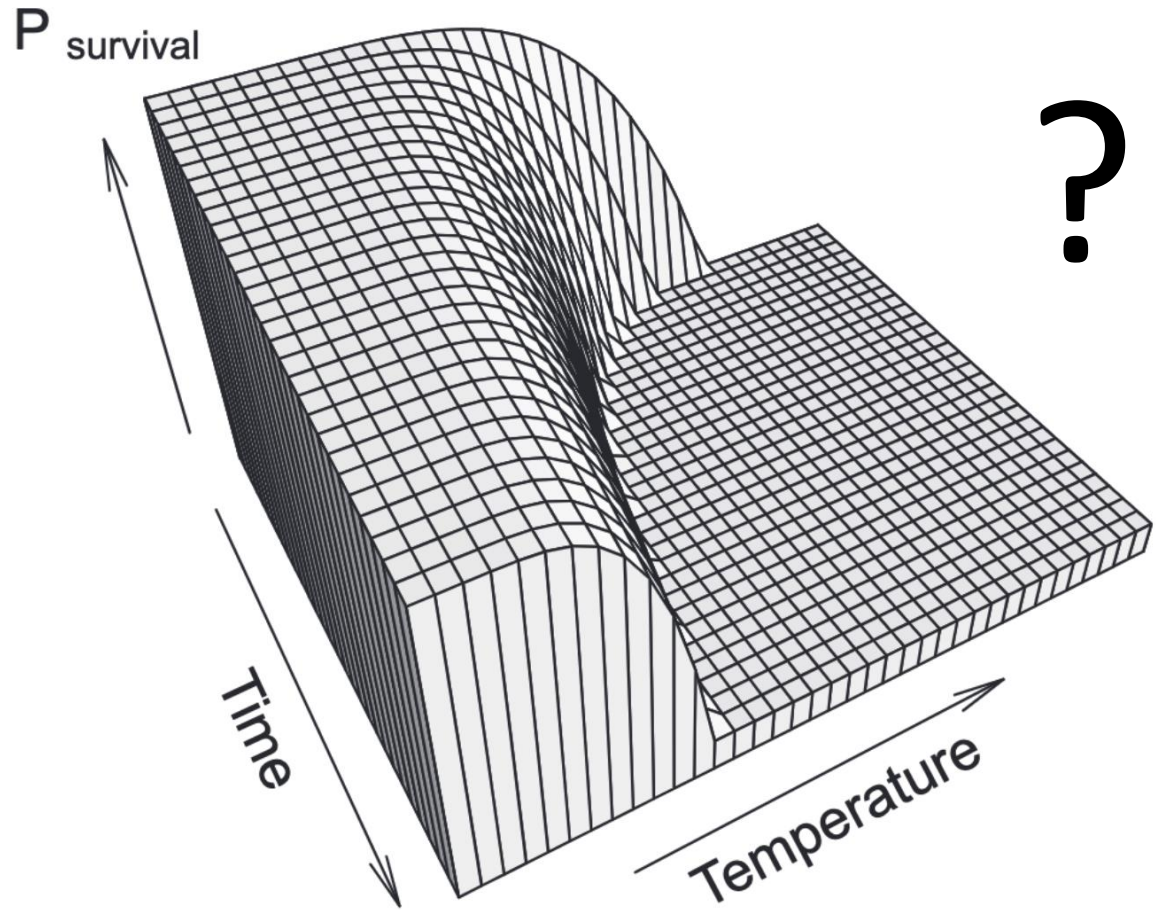
# Sensitivity



# Sensitivity

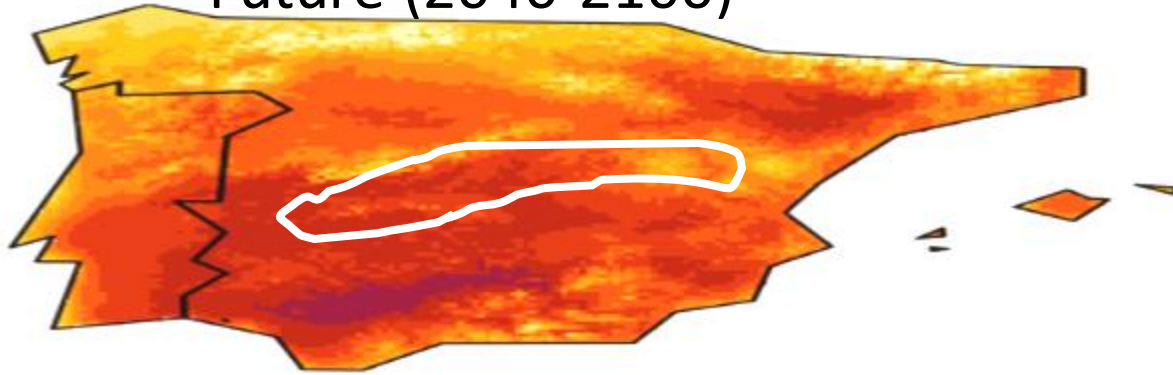


# Sensitivity



# Exposure

Future (2040-2100)



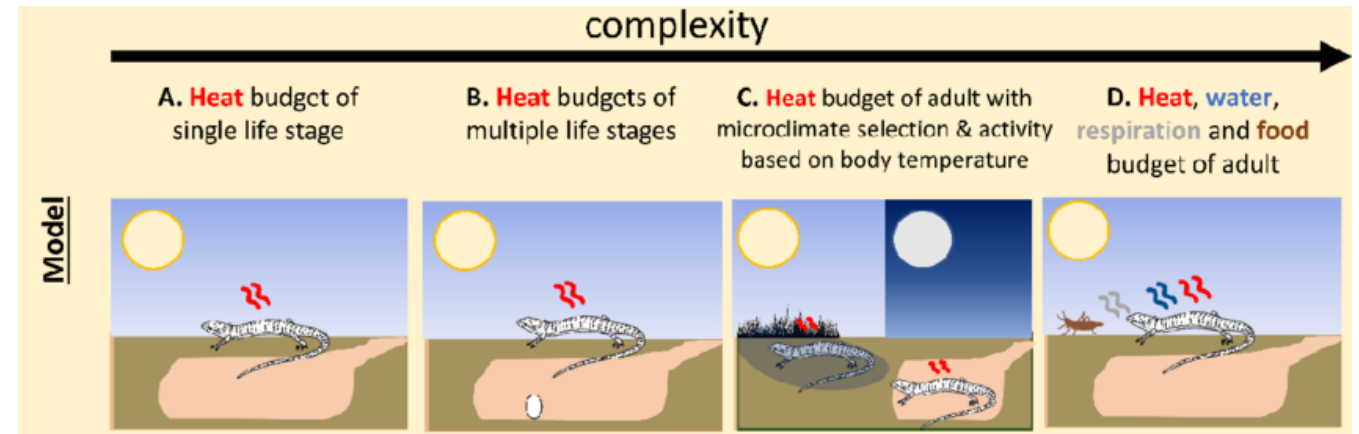
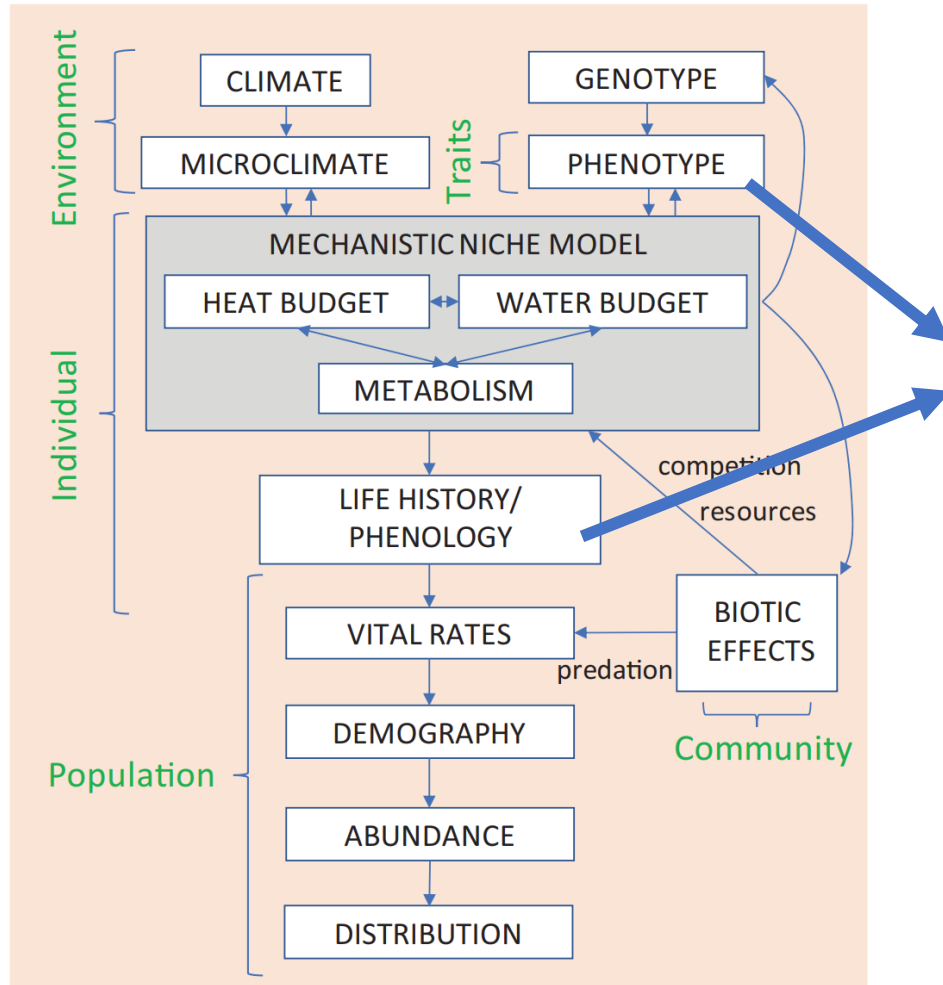
Present



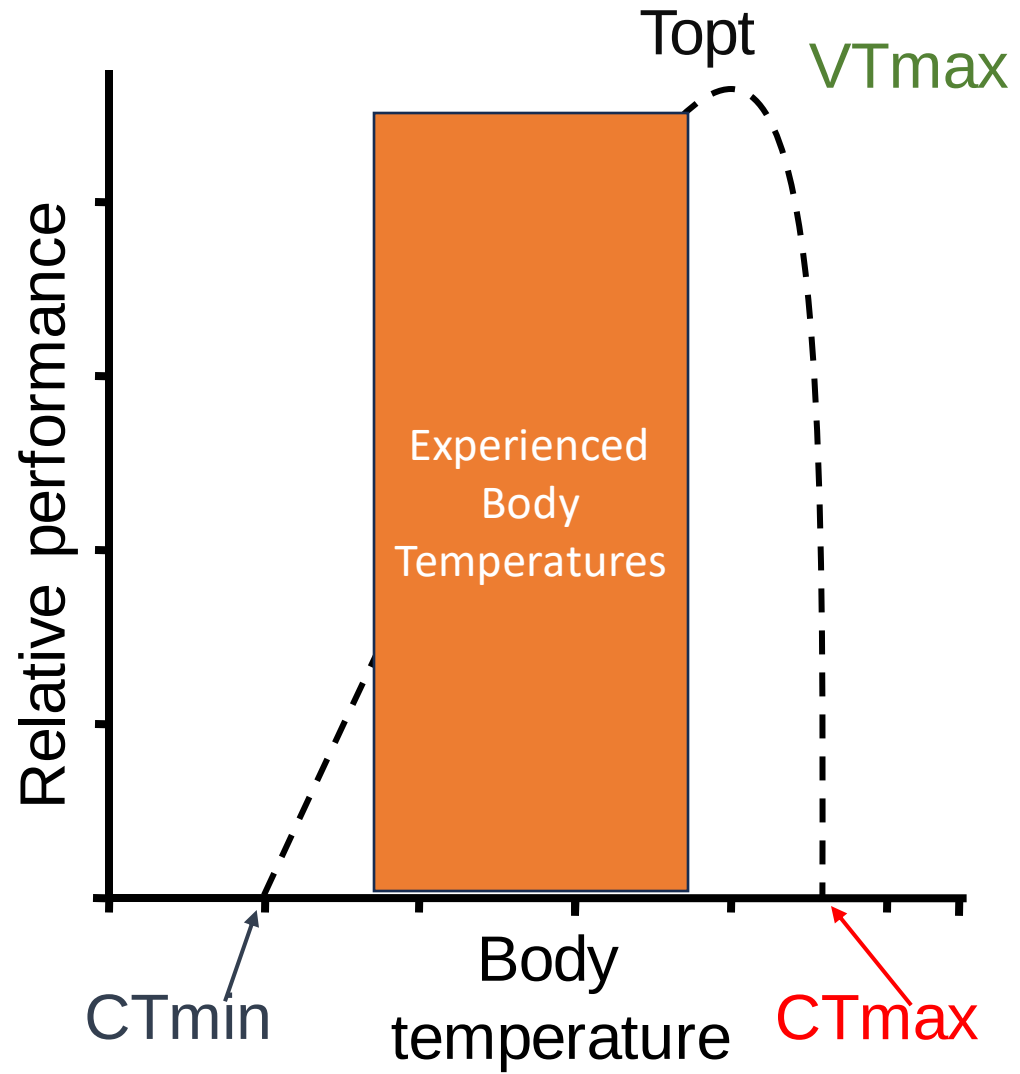
Jalapão, To.

Por Agustín Camacho

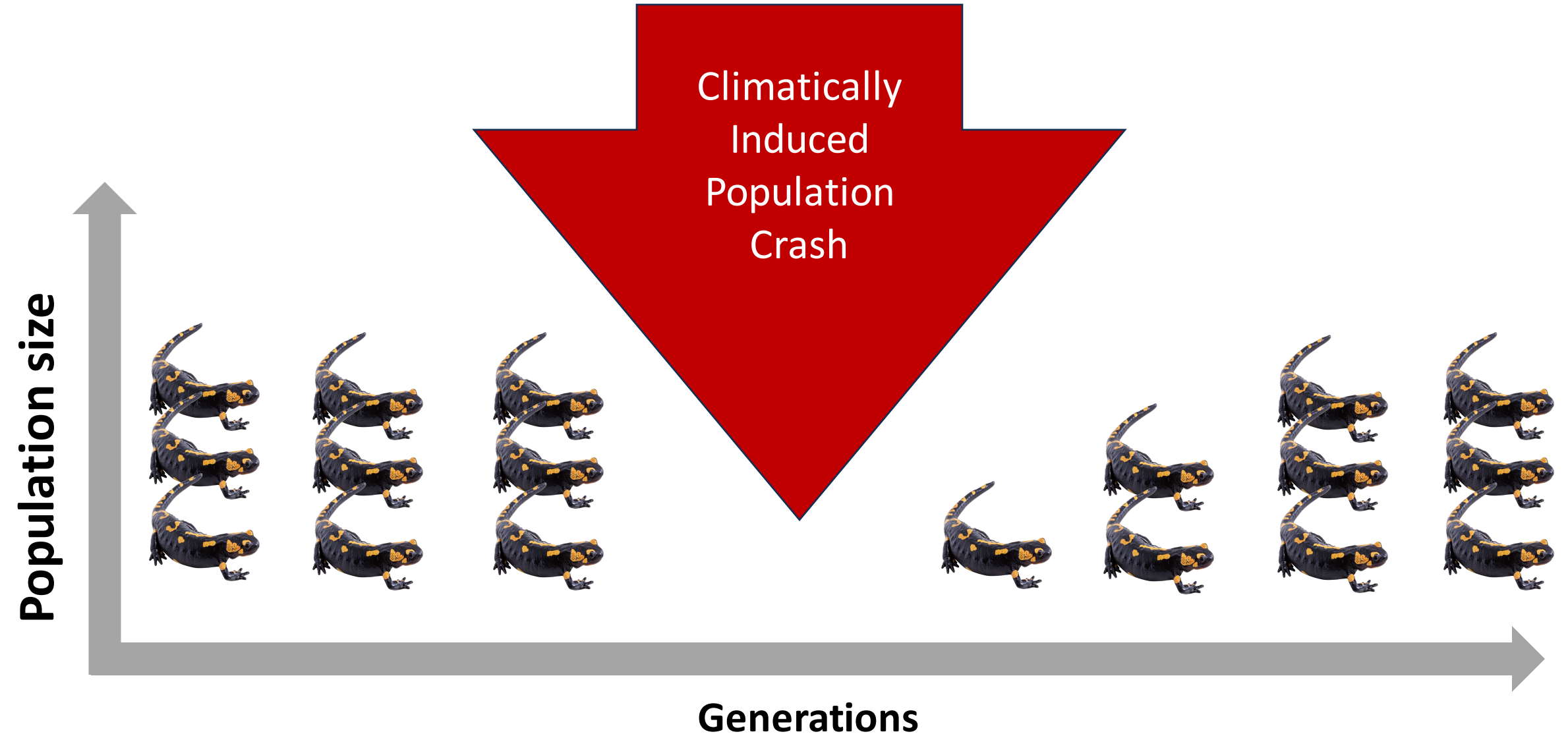
# Exposure



# Exposure

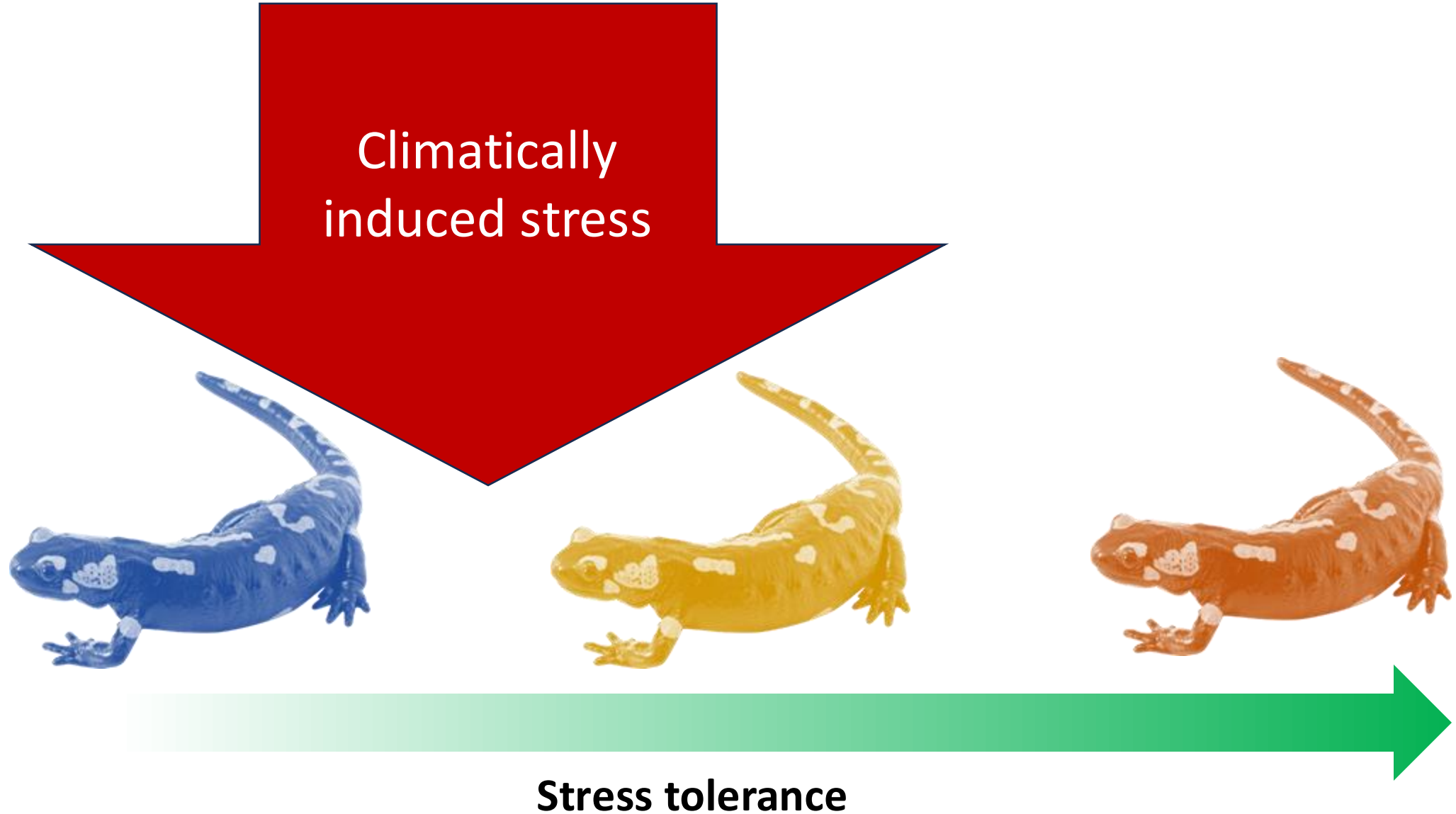


# Adaptability



# Adaptability

## 1. Evolutionary Adaptive potential

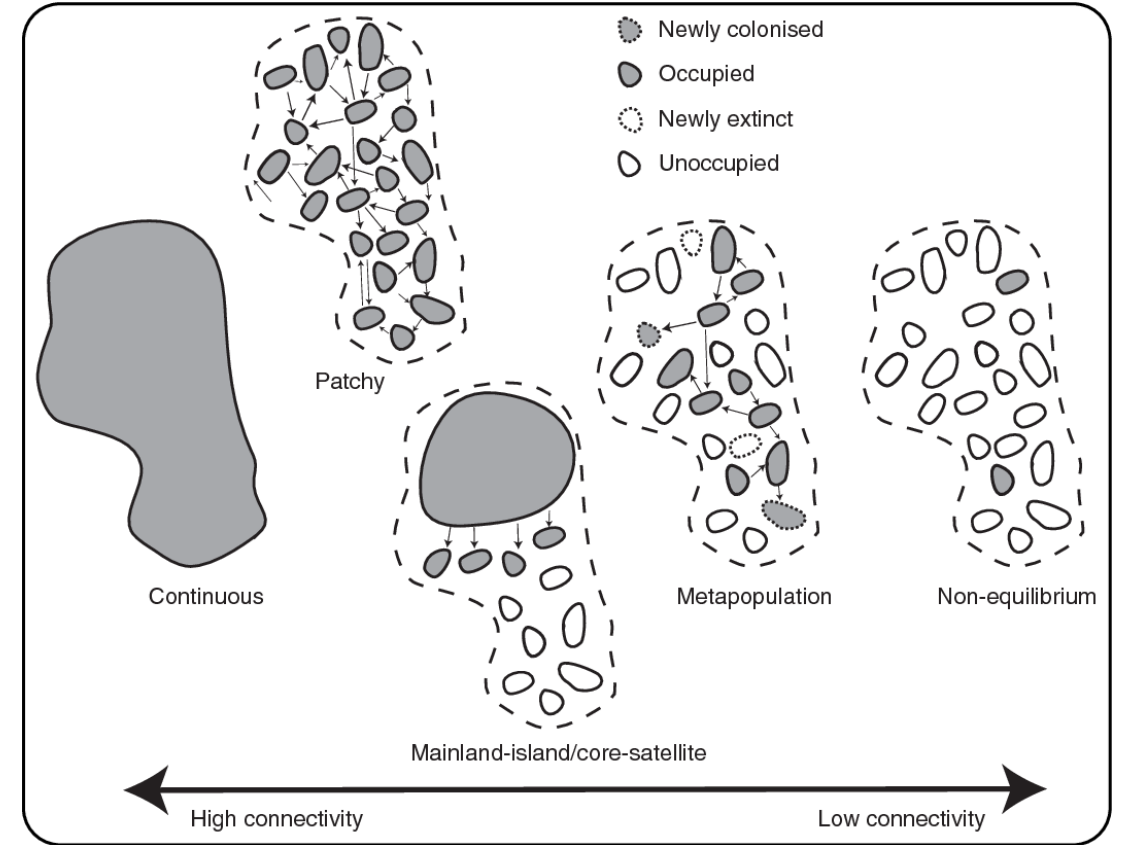


# Adaptability

## 2. Resilience



Anaxyrus canorus: Yosemite toad. US wildlife service.



# Vulnerability of species, or of populations?

OPEN  ACCESS Freely available online

 **PLOS** | ONE

## Identifying the World's Most Climate Change Vulnerable Species: A Systematic Trait-Based Assessment of all Birds, Amphibians and Corals

Wendy B. Foden<sup>1,2\*</sup>, Stuart H. M. Butchart<sup>3</sup>, Simon N. Stuart<sup>4,5,6,7</sup>, Jean-Christophe Vié<sup>8</sup>, H. Resit Akçakaya<sup>9</sup>, Ariadne Angulo<sup>8</sup>, Lyndon M. DeVantier<sup>10</sup>, Alexander Gutsche<sup>11</sup>, Emre Turak<sup>12,13</sup>, Long Cao<sup>14</sup>, Simon D. Donner<sup>15</sup>, Vineet Katariya<sup>1</sup>, Rodolphe Bernard<sup>16</sup>, Robert A. Holland<sup>17</sup>, Adrian F. Hughes<sup>1</sup>, Susannah E. O'Hanlon<sup>18</sup>, Stephen T. Garnett<sup>19</sup>, Çagan H. Şekercioğlu<sup>20</sup>, Georgina M. Mace<sup>21</sup>

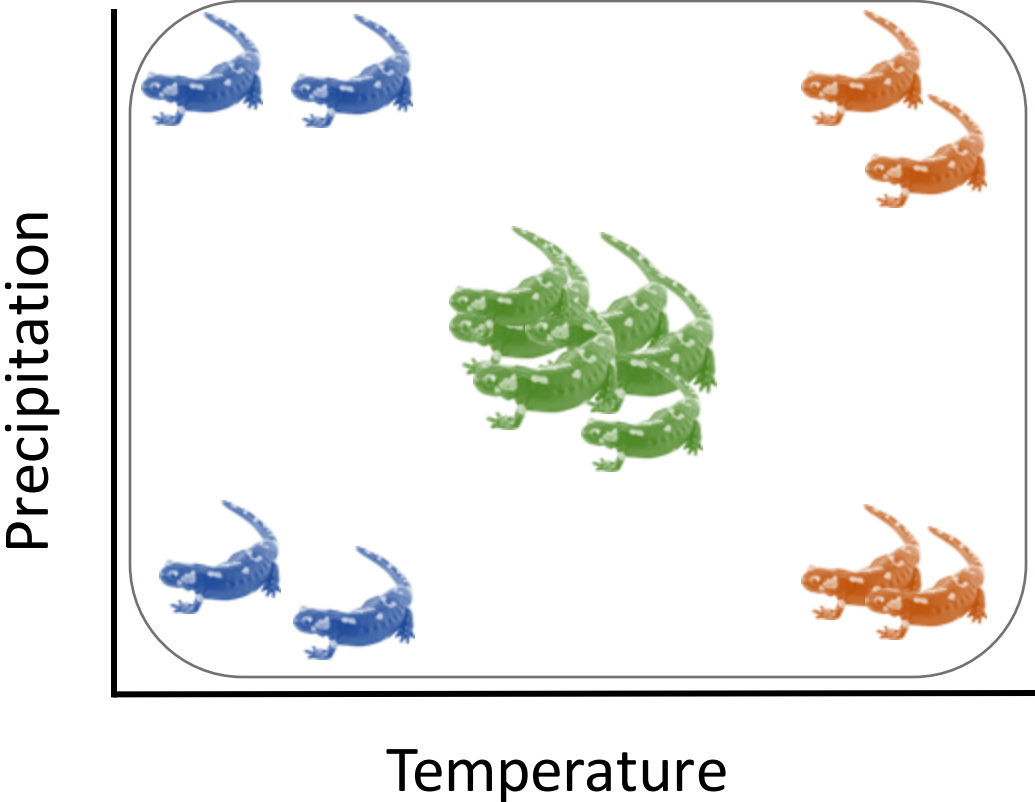
But so many other fantastic studies.. up to Muraly et al. 2023

# Vulnerability of species, or of populations?

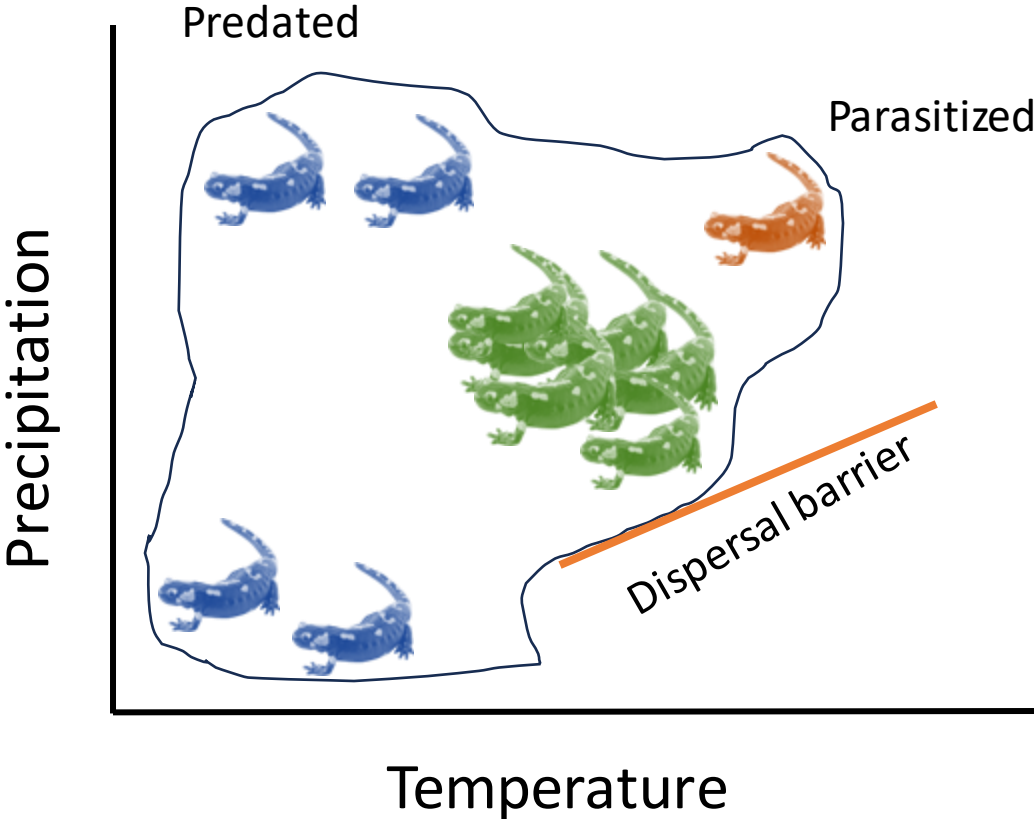


# Detection of sites under climatic threat

## Fundamental Niche



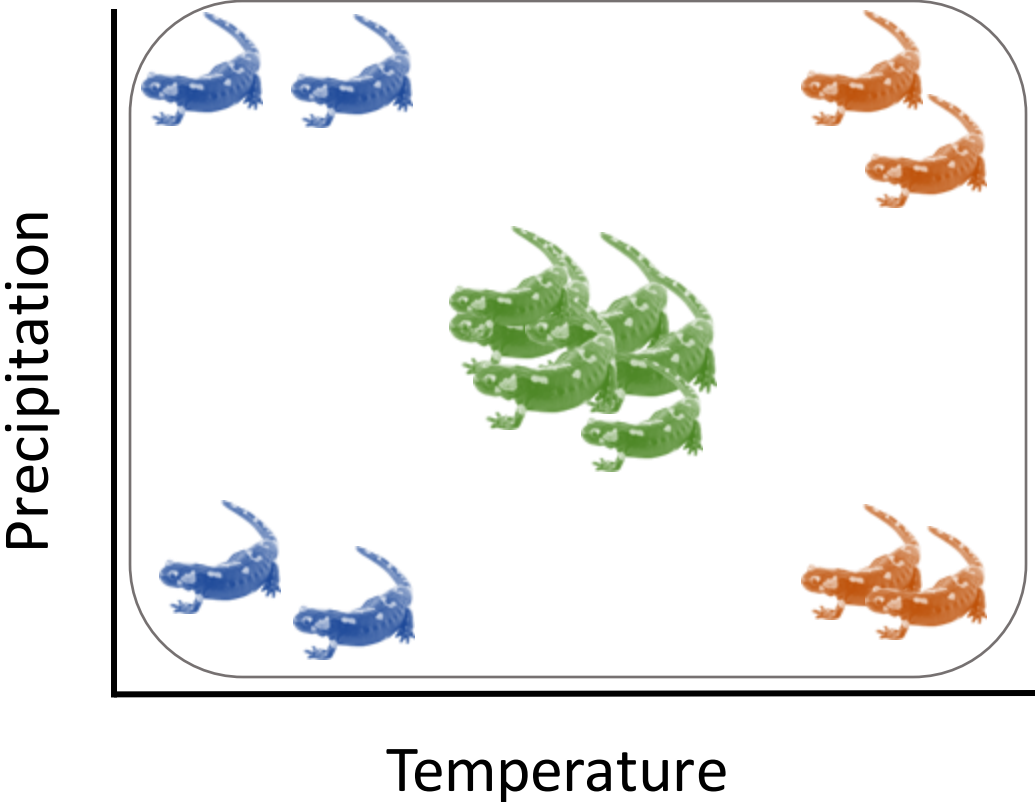
## Realized Niche



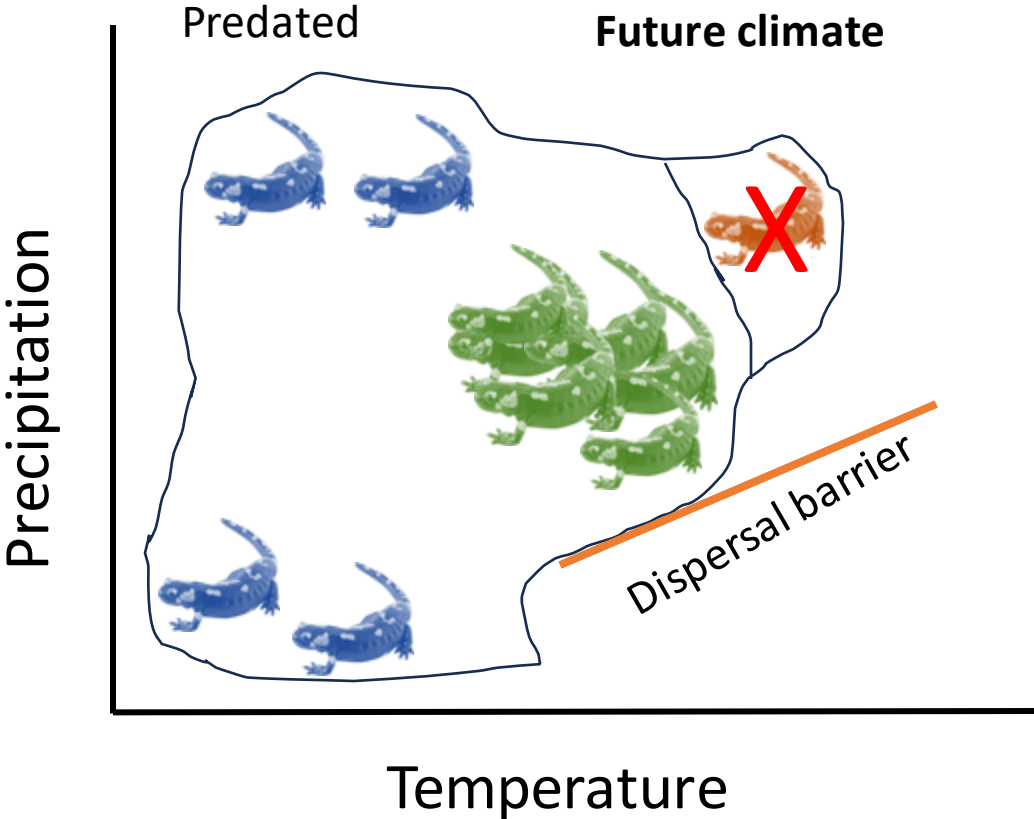
Hutchison, 1953

# Detection of sites under climatic threat

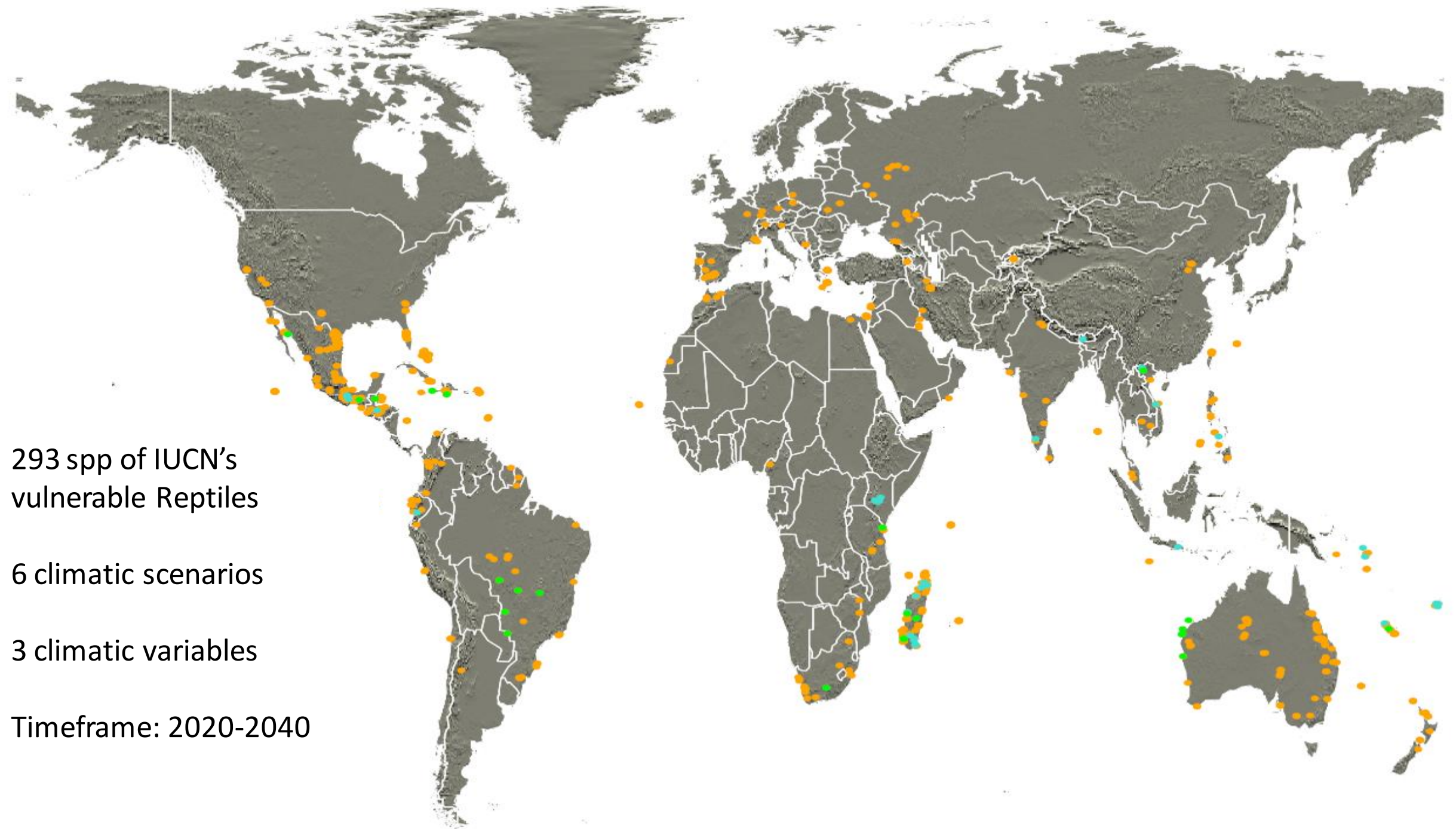
## Fundamental Niche

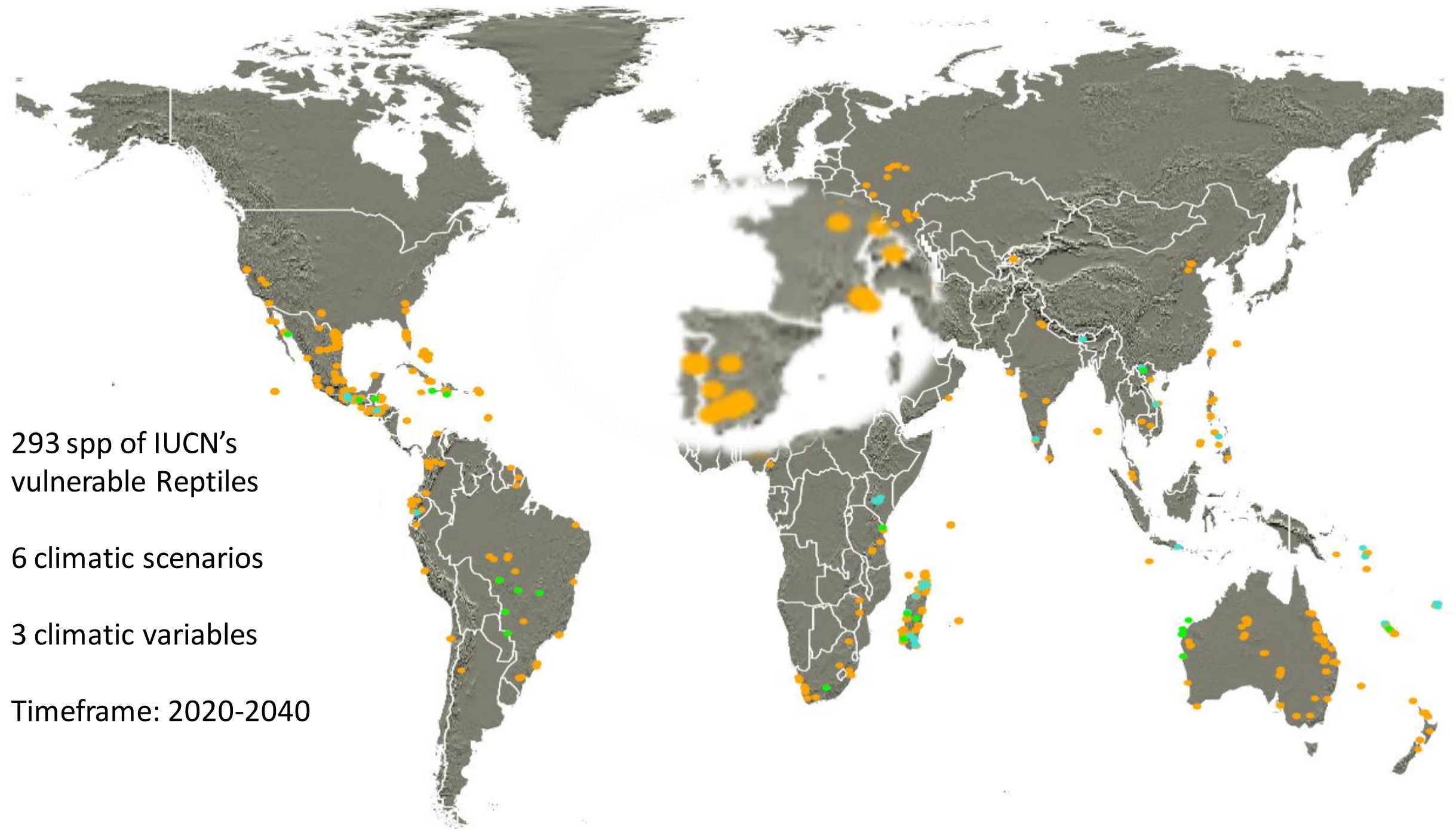


## Realized Niche



Hutchison, 1953



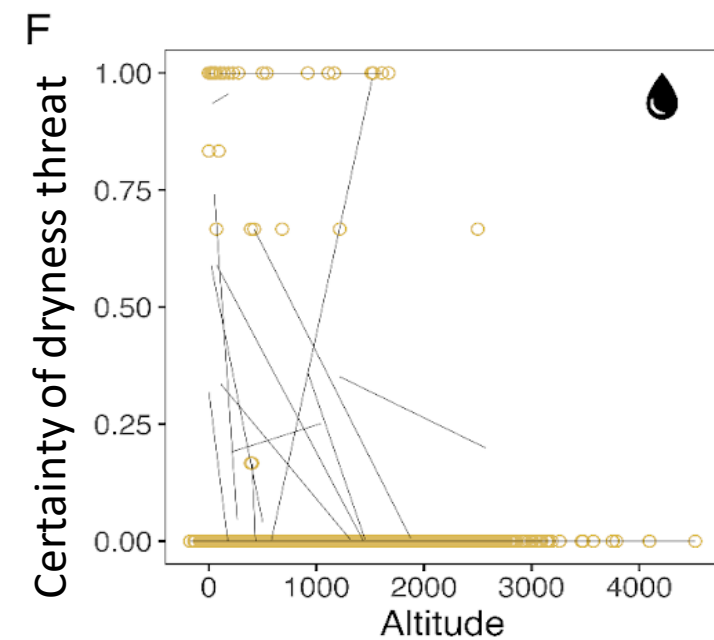
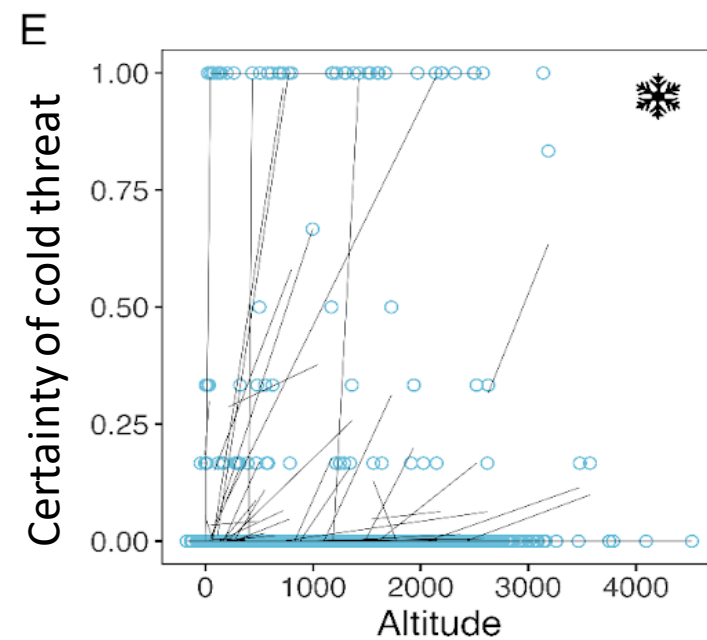
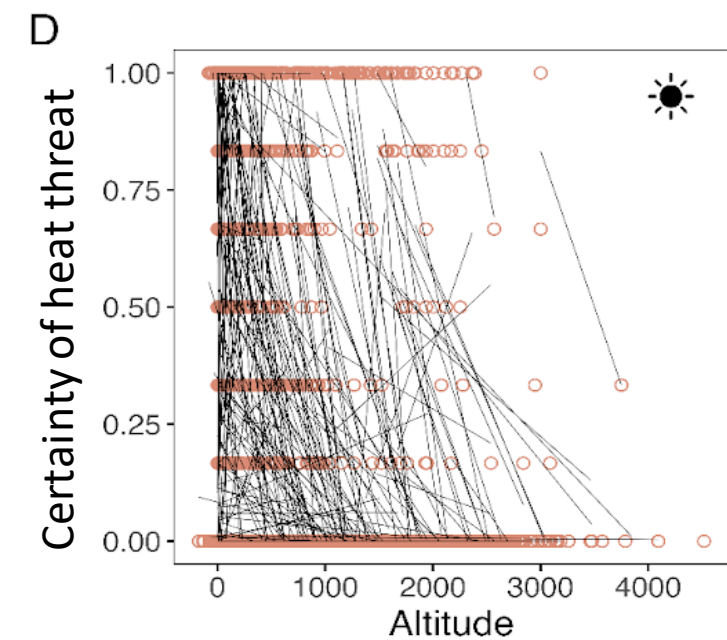
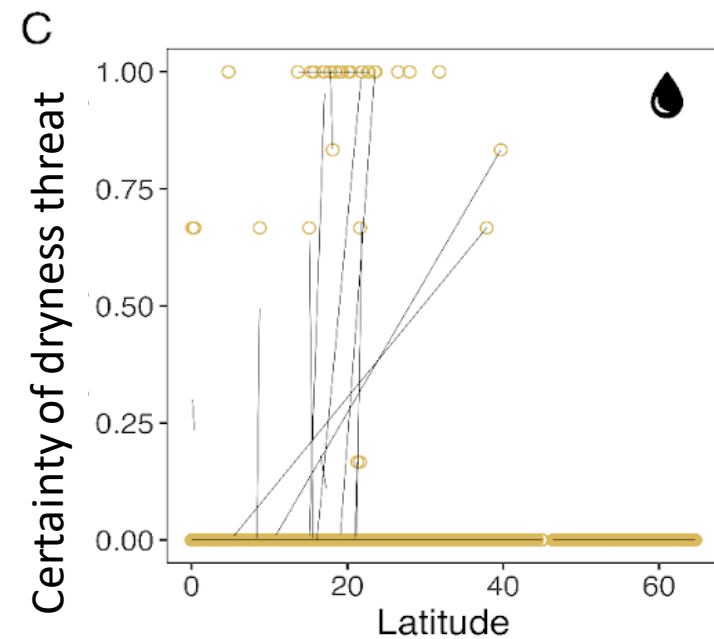
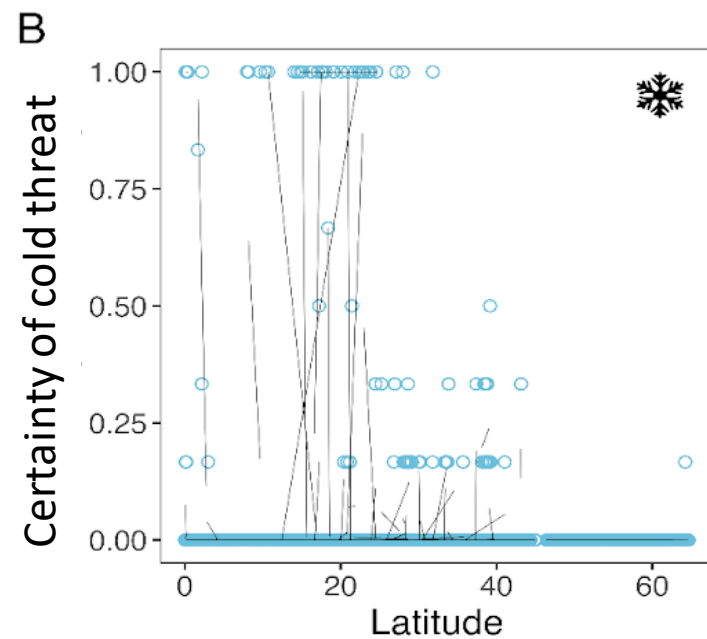
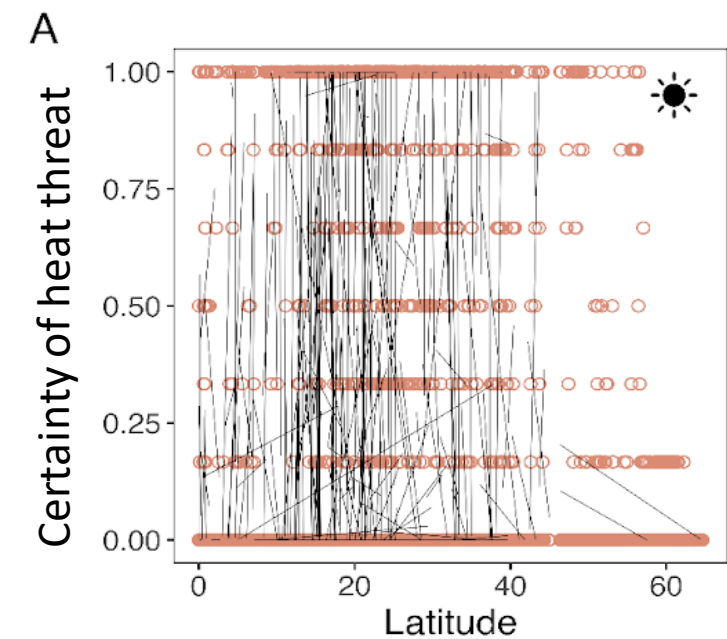


293 spp of IUCN's  
vulnerable Reptiles

6 climatic scenarios

3 climatic variables

Timeframe: 2020-2040



# Administrative responsibility

The European Court of Human Rights ruled this week that Switzerland had 'failed to comply with its duties' to combat climate change, violating the European Convention on Human Rights.



Members of the Senior Women for Climate Protection celebrate after the verdict in Strasbourg. © Shervine Nafissi / Greenpeace

# Two Key messages for climatic adaptation of herpetofaunal conservation:

- Lets get together to make administrations implement multidisciplinary research-guided conservation measures.
- Vulnerable reptiles (and likely amphibians) will be more certainly impacted at low elevation sites by the heat, and at high elevation sites by the cold. No clear precipitation impact patterns.

# Gracias!!



VulneraWeb



Dr. Miguel  
Tejado



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## Vulneraweb's Team



**Aïse Jandard**  
Being aware of the ecological challenges we are facing, I wish to be part of the global efforts for the conservation of ecosystems and their evolution. Thus I am involved in the process of increasing the knowledge of an ecosystem at its different levels and sharing it widely.  
I am actually developing prototypes for measuring voluntary maximum temperature in arthropods (macroinvertebrates, lepidoptera, bees, tadpoles and birds). And I enjoy participating in every step of the vulneraweb project.  
In particular, I love doing fieldwork with any animal or plant I can find.  
You can contact me by email: [LouisaJ5@protonmail.com](mailto:LouisaJ5@protonmail.com)



**Virginia Vichi-Miller**  
Virginia is an environmental anthropology student who is doing outreach for the VulneraWeb thermal tolerance project. She is currently studying how communities respond to environmental change and has been interested in wildlife conservation for several years too.  
Virginia loves to scuba dive and do photography during her free time!



**James Walker**  
I am involved in compiling and organizing large quantities of scientific data (regarding the thermal tolerance levels of organisms) and updating the current database with the latest scientific literature. Additionally, I am using R studio to create scripts that enables the user to download information from the website, assisting field work and assisting other members of the team.  
Previously to this role I graduated with a Masters of Biodiversity and Conservation with the University of Exeter, enabling me to obtain a strong skillset in data analysis, ecological surveying, and using GIS software. Outside of work I am very passionate about surfing and the study of cetaceans.  
Email: [jamesarchurwalker@hotmail.com](mailto:jamesarchurwalker@hotmail.com)



**Rosie White**  
Rosie is currently updating the Vulneraweb website, reviewing manuscripts, and assisting field work. She enjoys being involved in the diverse work and looks forward to visiting many new places in Spain! Especially for seeing wildlife, hiking, and snorkeling.  
Before this role, she worked and studied in South Africa, specialising in ecology and conservation. Rosie shares photos and videos from her travels on her instagram account @connectwith\_rosiewhite.



**Jacob Peers-Dent**  
Jacob worked to assemble, film and edit video tutorials that demonstrate how to measure the thermal tolerances of animals. He also helped to develop the Vulneraweb website. Jacob thoroughly enjoyed his internship as part of the vulneraweb thermal tolerance project and the time he spent in Spain. He believes that understanding how organisms adapt to the changes in our world is of vital importance, especially in this age of anthropogenic climate change.  
Prior to his work here, Jacob obtained a Masters in Zoology from the University of Sheffield and worked as research assistant in Thailand. He is currently working as a research scientist back in the UK.  
Contactable via email: [jpeersdent@gmail.com](mailto:jpeersdent@gmail.com)

