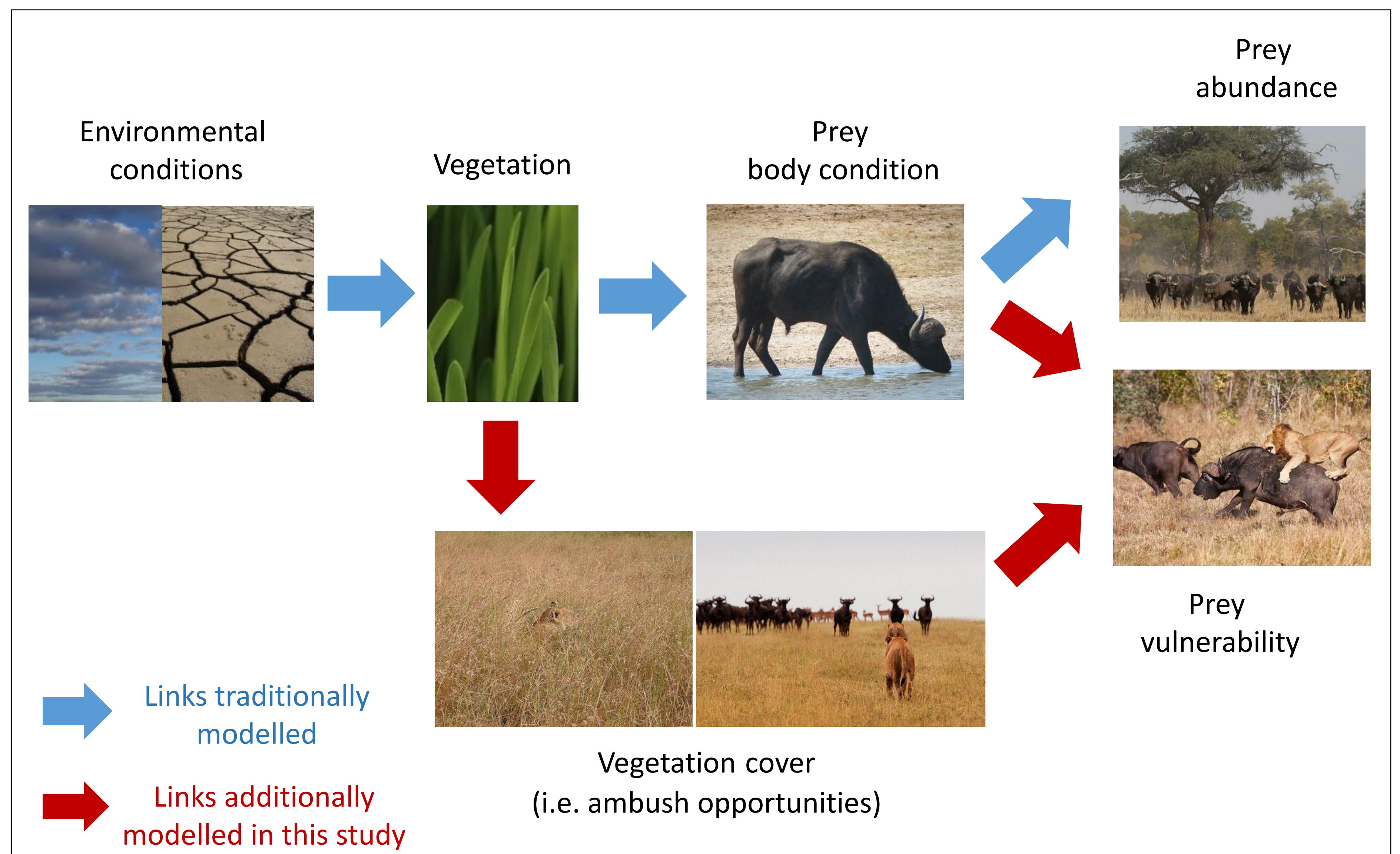


Climate effects on prey vulnerability influence predator responses to climate fluctuations

Aïssa Morin, Simon Chamailé-Jammes, Marion Valeix

Context and objectives

- Climate changes affect not only the distribution and abundance of organisms, but also the nature and outcome of species interactions.
- A number of models have investigated how climate fluctuations can affect predator-prey interactions and dynamics by changing prey abundance through changes in resource availability.
- Field studies however show that vulnerability, a key feature determining the outcome of predator-prey interactions, can vary with climatic conditions, through either changes in prey body condition or in habitat characteristics (e.g. vegetation cover).
- With a focus on large mammals and rainfall effects, we explored how the interplay between climate induced changes in prey abundance and prey vulnerability affects short- and long-term responses of predator populations to climate changes.



Methodology

- In a modelling approach, we accounted for the effects of climatic conditions (through effects on prey body condition and habitat characteristics) on prey vulnerability to predation in an otherwise standard predator-prey population dynamics model.
- We assessed 4 scenarios:
 - Scenario 1:** prey vulnerability to predators do not vary with prey body condition nor with climate-driven habitat characteristics. All prey are vulnerable to predation. Climatic conditions therefore influence predator-prey interactions through their impacts on prey abundance only.
 - Scenario 2:** prey vulnerability is affected by climatic conditions through their influence on prey body condition. The poorer a prey body condition, the more vulnerable to predators the prey is. This is typically the case for interactions involving cursorial predators.
 - Scenario 3:** prey vulnerability is affected by climatic conditions through climate-driven changes in habitat characteristics (e.g. vegetation cover). This is typically the case for interactions involving ambush predators.
 - Scenario 4:** prey vulnerability is affected by both prey body condition and climate-driven changes in habitat characteristics (combination of scenarios 2 and 3).

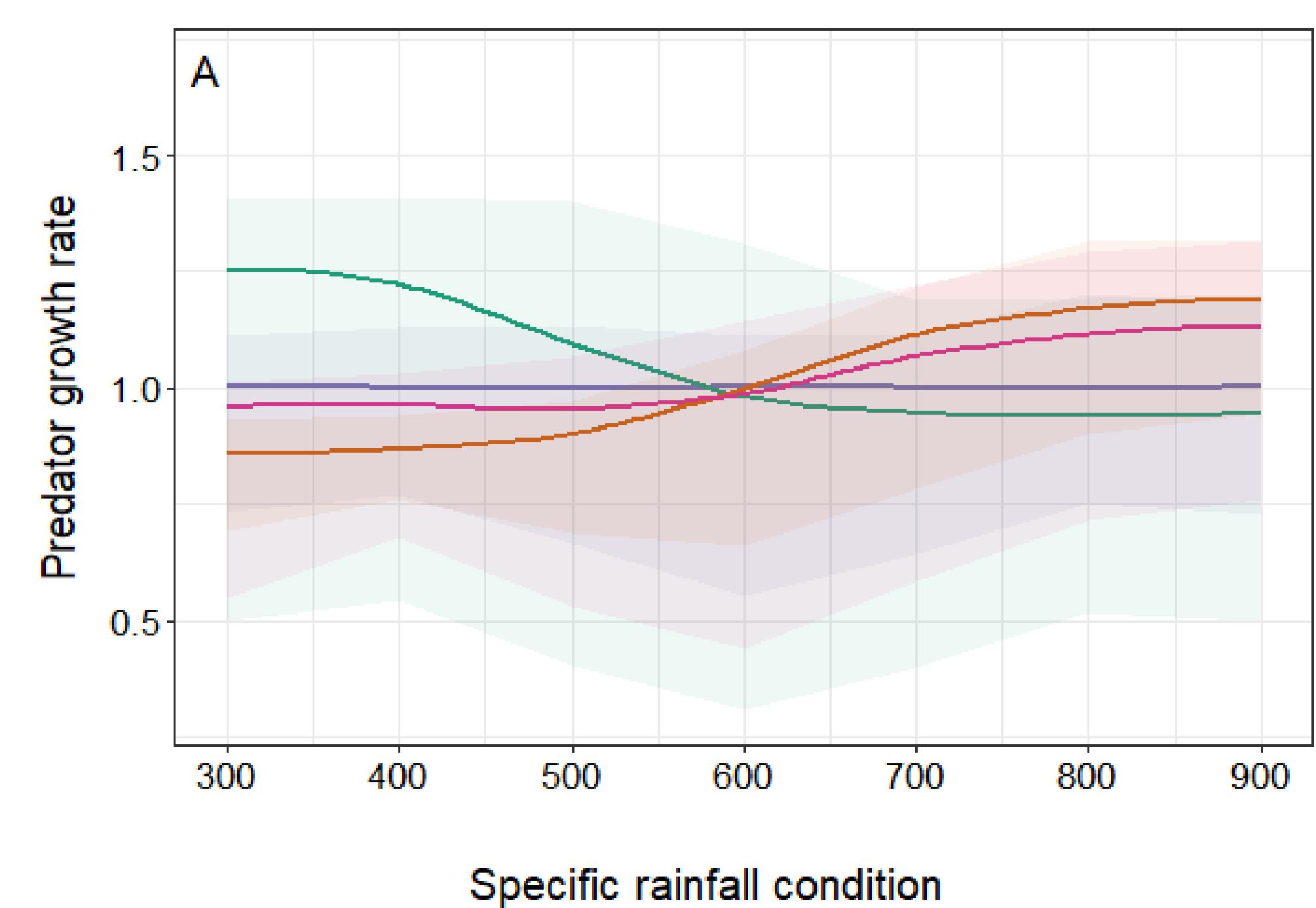
Scenario1 Scenario2 Scenario3 Scenario4

Conclusion

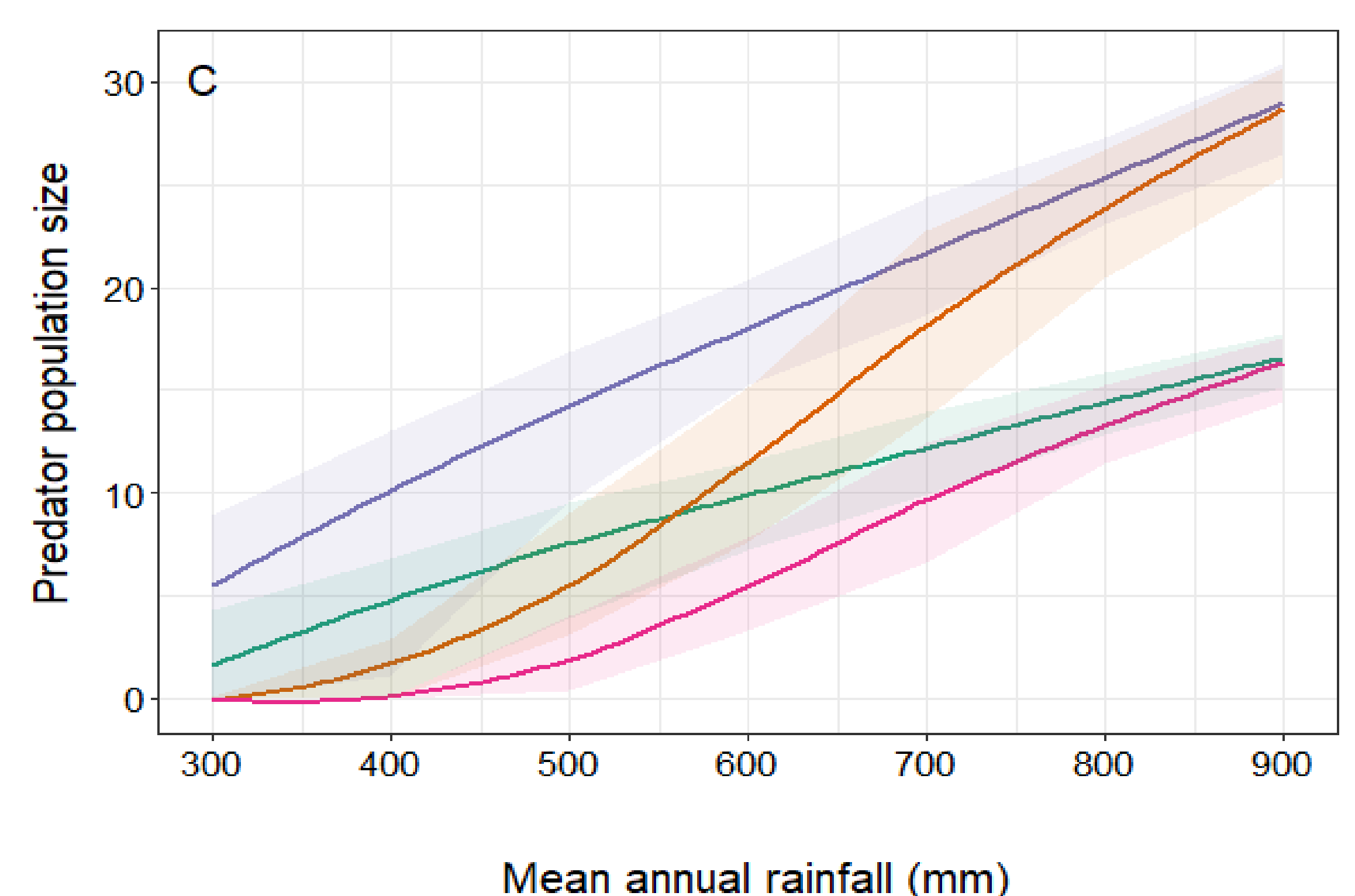
- This theoretical work reveals that integrating climate influence on prey vulnerability, in addition to resource-mediated climate effects on prey abundance, leads to different and sometimes non-linear responses of predator populations to changes in climatic conditions.
- Our study further highlights the importance to have a good understanding of the processes determining vulnerability at play within the predator-prey pair studied.

Results

Immediate response of predator populations to specific rainfall conditions



Long-term response of predator populations to changes in mean annual rainfall



Corresponding author:

Aïssa Morin
morinaissa@gmail.com

