INTRODUCTION

Various studies have demonstrated that species' traits can be important predictors of the type and intensity of responses to climate change (Thomas and Lennon, 1999; Parmesan and Yohe, 2003; Cheung et al., 2012). Various studies have demonstrated that species' traits can be important predictors of the type and intensity of responses to climate change (Thomas and Lennon, 1999; Parmesan and Yohe, 2003; Cheung et al., 2012).

A generic tool that could be applied to other taxonomic groups is the exploratory potential index. From a geographic point of view, the exploratory potential index can be defined as the ability to reach new suitable habitats outside of current ranges. More specifically, a species' exploratory potential is defined as the ability to reach new suitable habitat beyond current ranges, under climate change.

Based on these conclusions, how can we easily assess the exploratory potential of species in order to provide insights for biological conservation?

Exploratory potential index

- Analytical Hierarchy Process (Saaty, 1980, 2008)
- Breaks a complex problem down into simplest issues to get relevant experts' opinions
- Combines experts' opinions and observed data into a synthetic metric

Work plan assigned to taxonomic group of 15 experts

1. Determine the weight of the 3 main criteria (Level II) related to exploration ability using pairwise comparison matrices
2. Determine key life-history traits and ecological attributes (Sub-criteria in level III) relevant for each criterion (e.g. body size at maturity, number of reproduction events, homing, distance covered to access feeding grounds, earliness of first maturity, ...)
3. Derive weights of each criteria from pairwise comparison matrices

Data sources

- Behavioral, morphological and physiological traits databases coded into ordinal modalities
- 1st case study: diadromous fish species of the Northern Atlantic
- Database regarding 20 diadromous fish species
  - TraitDiad (Irstea)
  - FishTraits (Frimpong and Angermeier, 2009)

In response to climate change, some species have shifted their latitudinal and elevational distributions by exploring new suitable habitats outside of their ranges (Thomas and Lennon, 1999; Parmesan and Yohe, 2003; Cheung et al., 2012).

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Perspectives

- Characterize geographic areas in terms of the exploratory potential of their fish assemblages
- Identify geographic areas hosting species with high or low (extreme) values of exploratory potential and thus of priority for biological conservation and management
- A generic tool that could be applied to other taxonomic groups of interest (e.g. micro-organisms, amphibians, birds...)

Exploratory potential index

- Consensus among the 15 experts concerning the life traits impacting the phases of the exploration process
- Two visions among experts concerning the phases of the exploration process
  - Capital breeding strategy and income-breeding strategy (Jager et al., 2008)
  - Major importance of the departure phase (irruptive migration)
- An index globally consistent with the literature that allows to identify and "rate" different dispersal strategies and support strong discrepancies in the ability of anadromous fish of northern Atlantic to explore potential suitable habitat

Validation

- Compare the species ranking obtained with the exploratory potential index to mono-specific model simulations (Lassalle et al., 2008; Rougier et al., 2014)
  - Hypothesis: species showing good repositioning capabilities in simulation model should get a high value of exploratory potential index
- Compare the species ranking obtained with the exploratory potential index to empirical data, e.g. the range of their (historical) distribution area
  - Hypothesis: species with a large range that testified of a good post-glacial re-colonization should get a high value of exploratory potential index