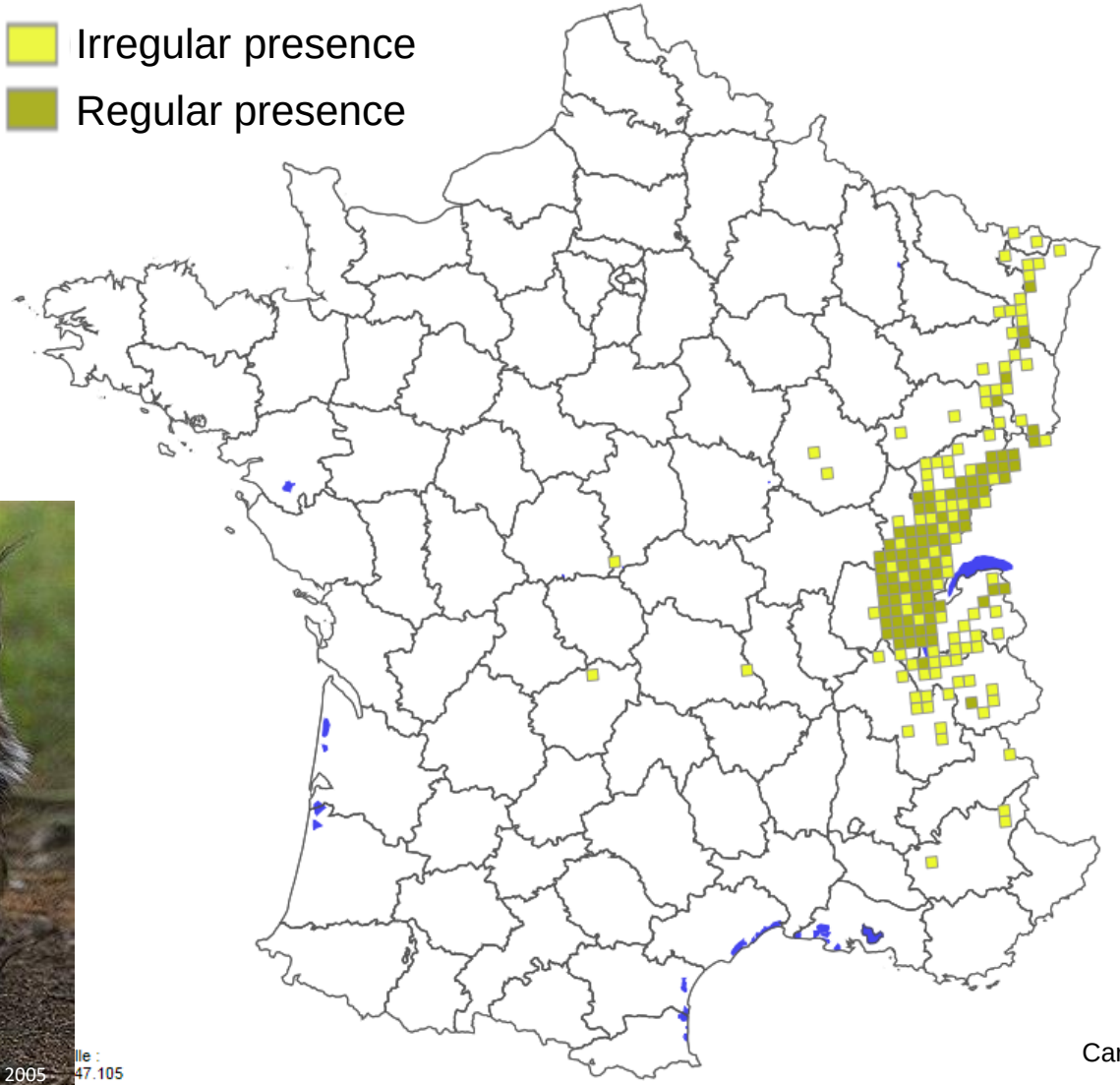
October 23rd, 2018
SFEcologie 2018

Guiding decision-making to mitigate lynx-vehicle collisions using spatially-explicit individual-based models

Sarah Bauduin, Laetitia Blanc, Cyril Bernard, Anaïs Charbonnel, Luc Chrétien, Christophe Duchamp, Nolwenn Drouet-Hoguet, Estelle Germain, Arzhela Hemery, Stephanie Kramer-Schadt, Eric Marboutin, Alain Morand, Fridolin Zimmermann, and Olivier Gimenez

The Eurasian lynx in France (2017)

(Lynx lynx)



© ONCFS Réseau Loup Lynx
Carmen 2017 / 01/04/2014-31/03/2017

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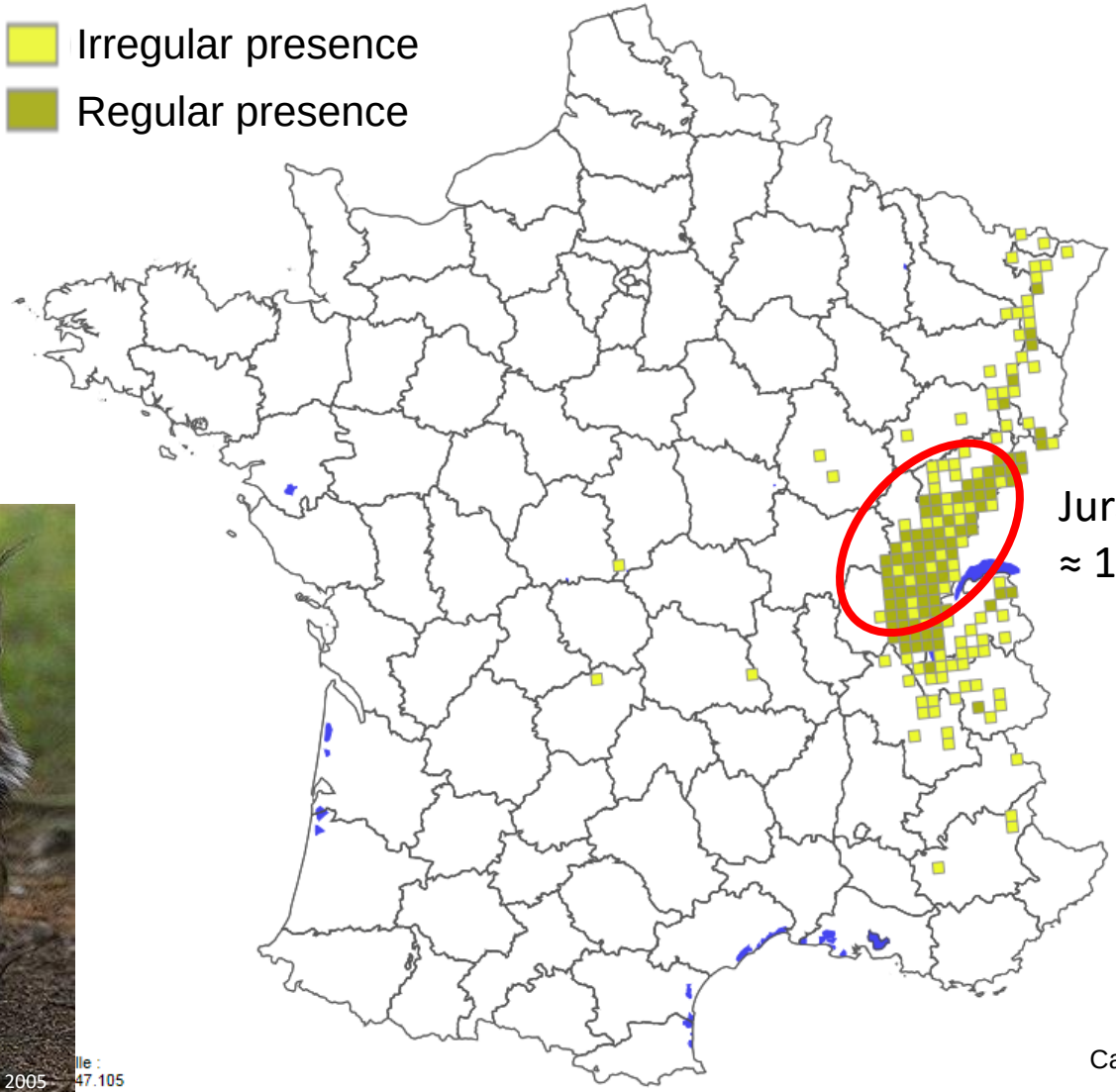

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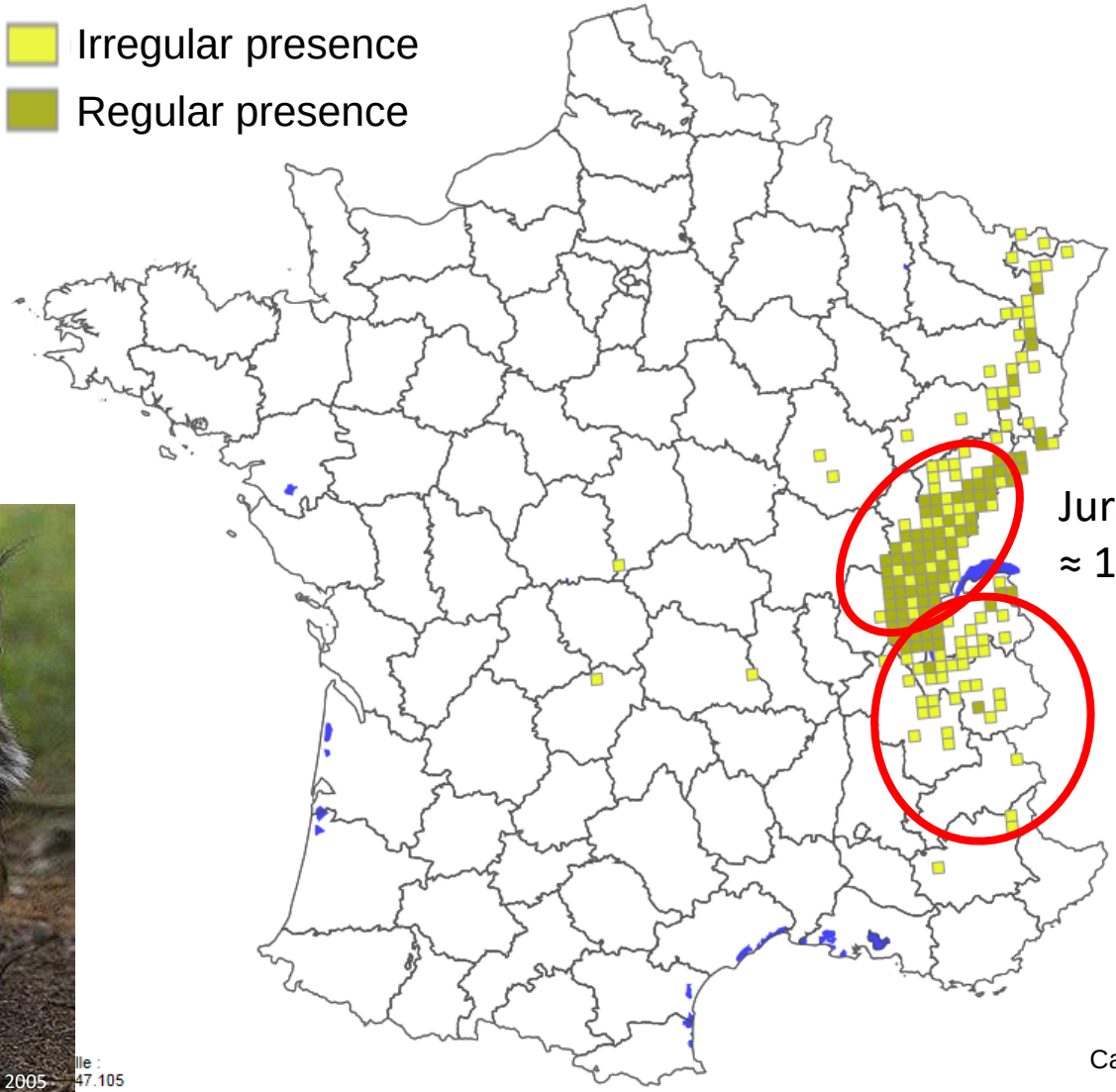

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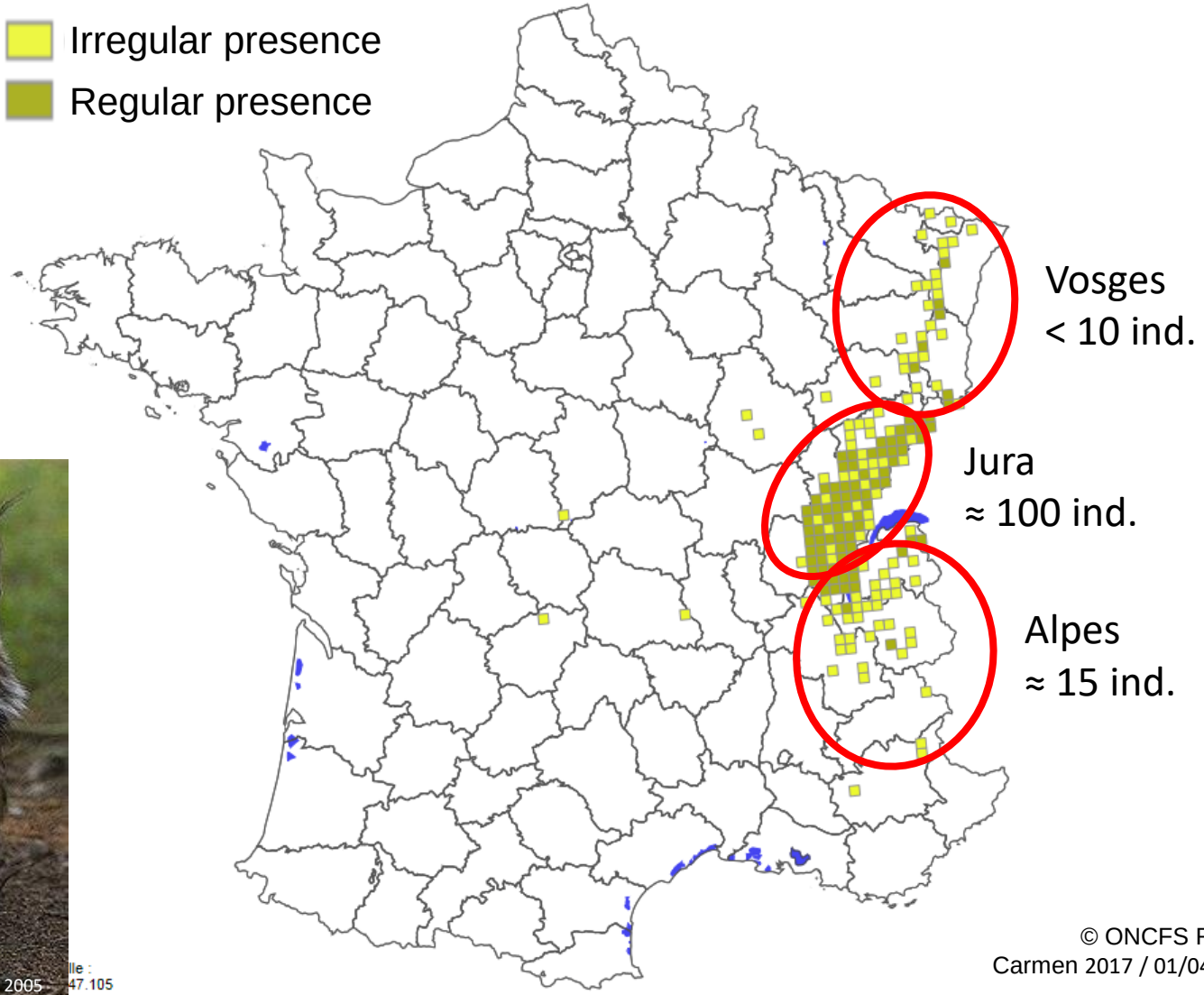

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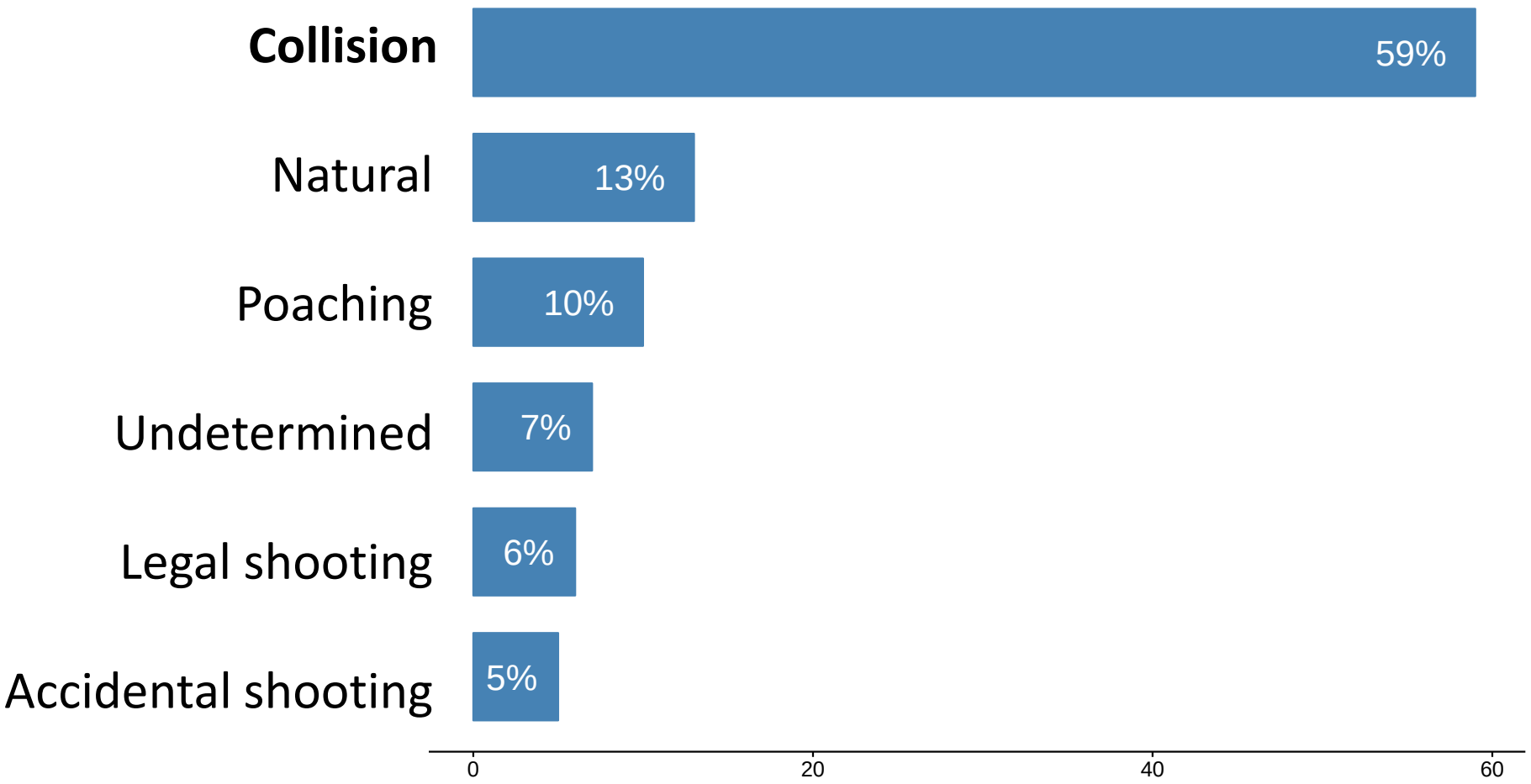
Mortality causes (France)



Bulletin d'information du Réseau Lynx n15, 2009

Goals

- Provide a tool to help decision-making to reduce lynx collisions

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    Lynx viability ~ transport infrastructure

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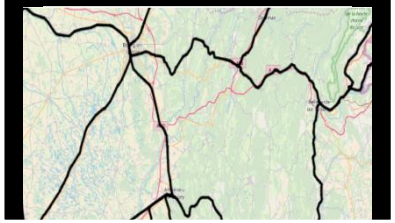
Transport infra.



Land cover

Current lynx pop.

Lynx ecology

- Reproduction
- Mortality
- Dispersal
- Territory settlement

Kramer-Schadt et al. (2004, 2005, 2011)

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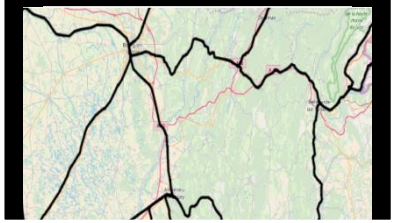

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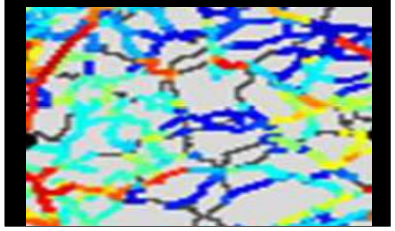

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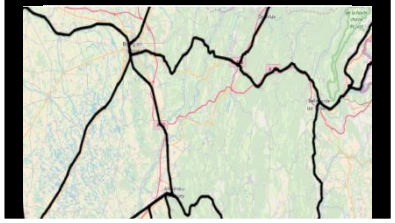

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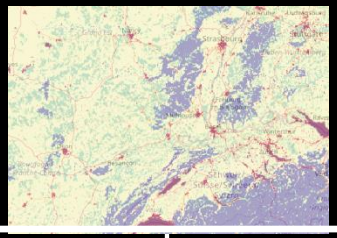

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Habitat model

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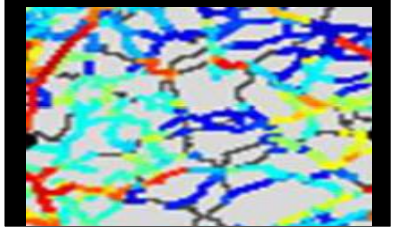

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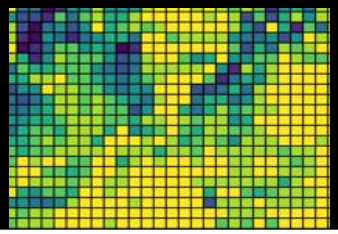

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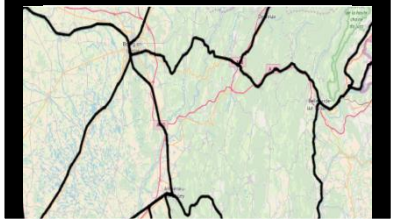

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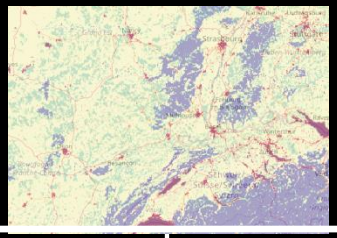

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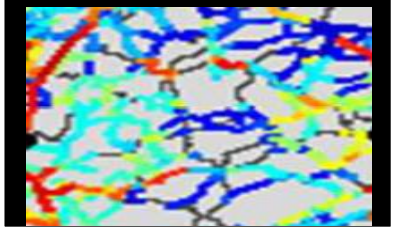

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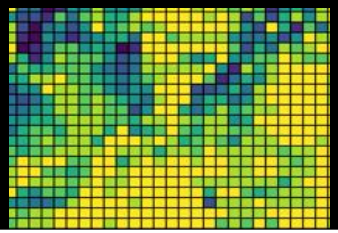

Spatially explicit individual-based model

Blanc (2015)

Lynx viability

Lynx model

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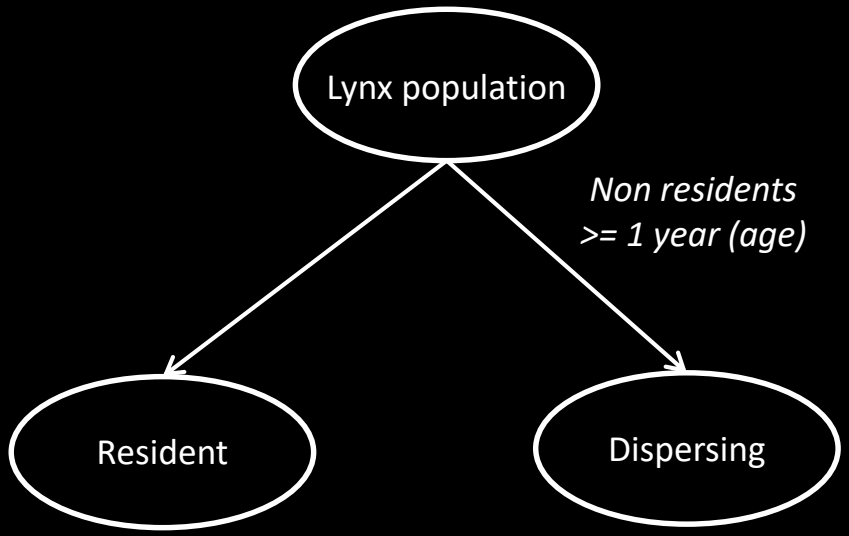
- SE-IBM = Influence of the environment on the decisions made by the individuals

Lynx SE-IBM

Lynx population

Kramer-Schadt et al. (2004, 2005, 2011), Blanc (2015)

Lynx SE-IBM



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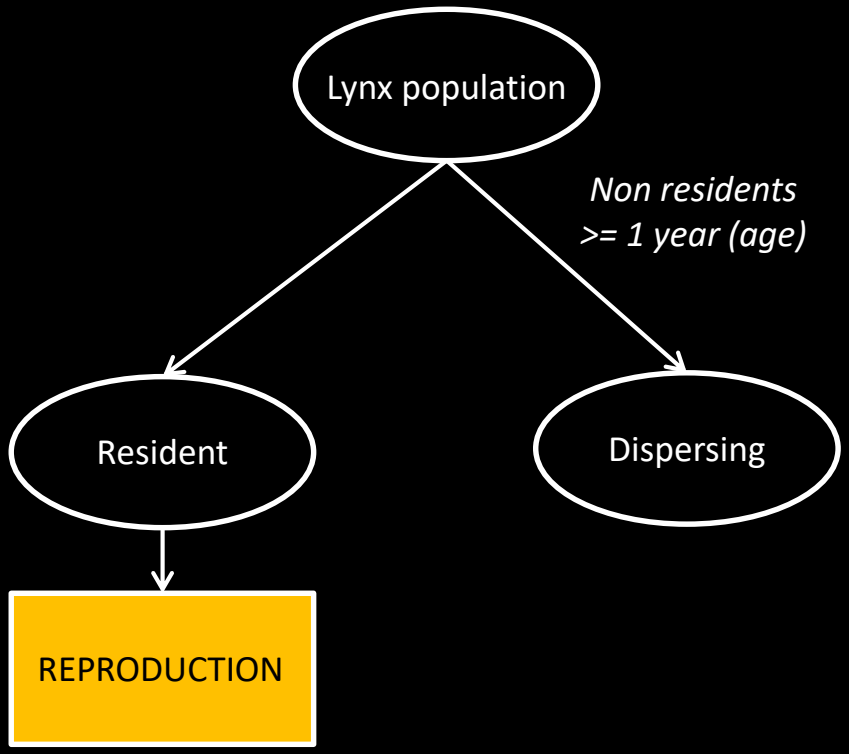

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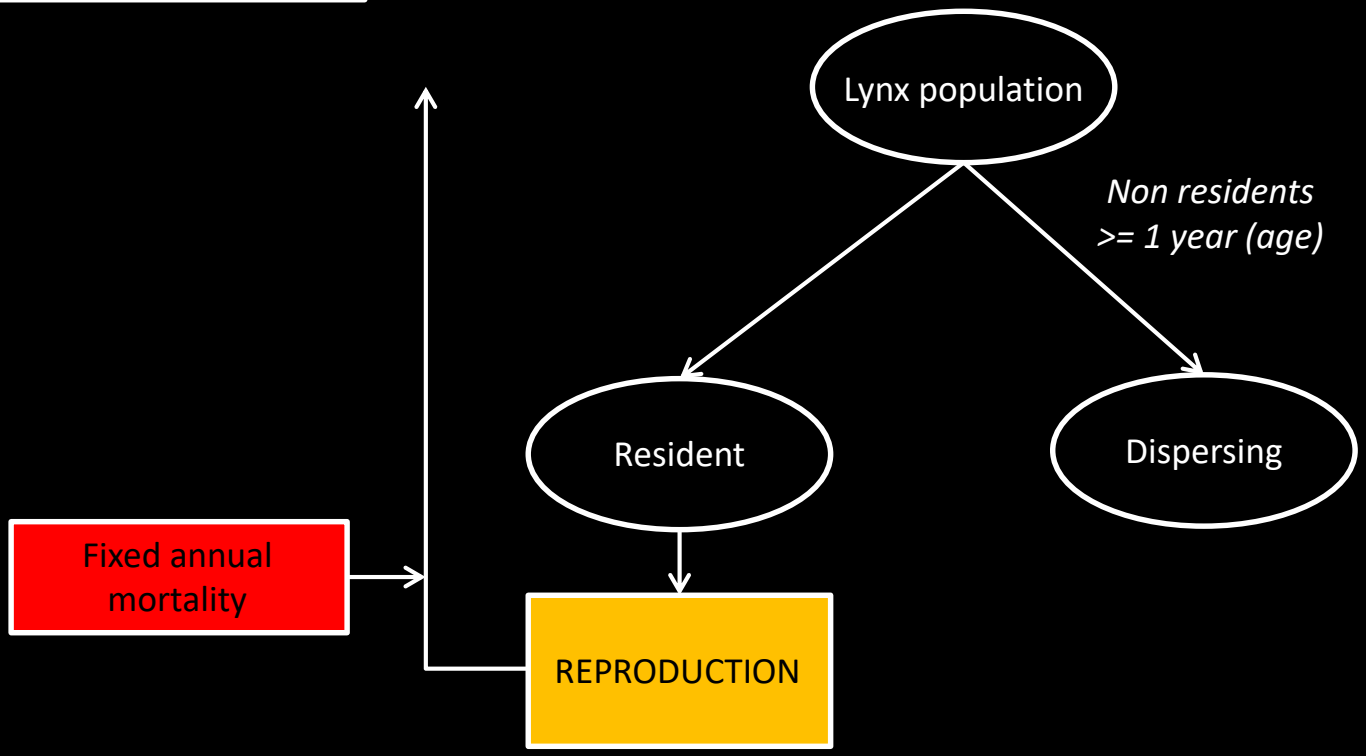

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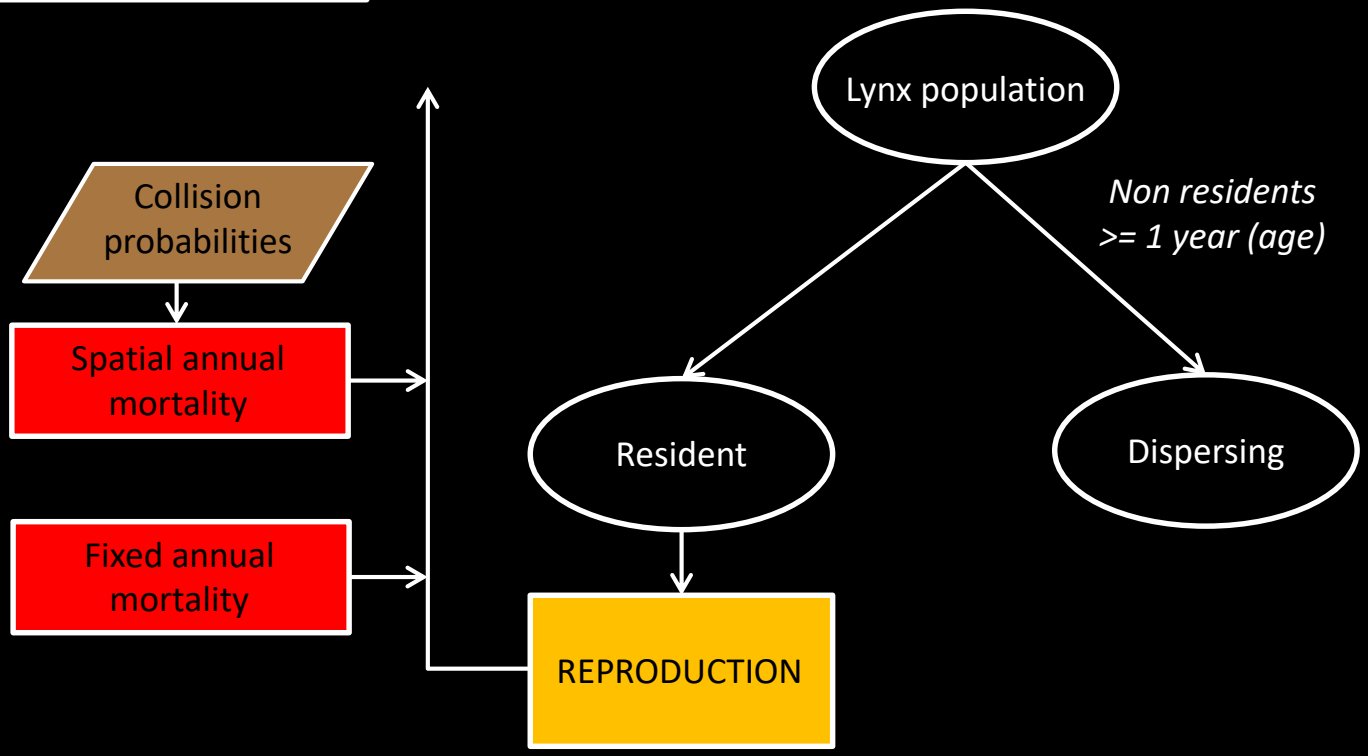

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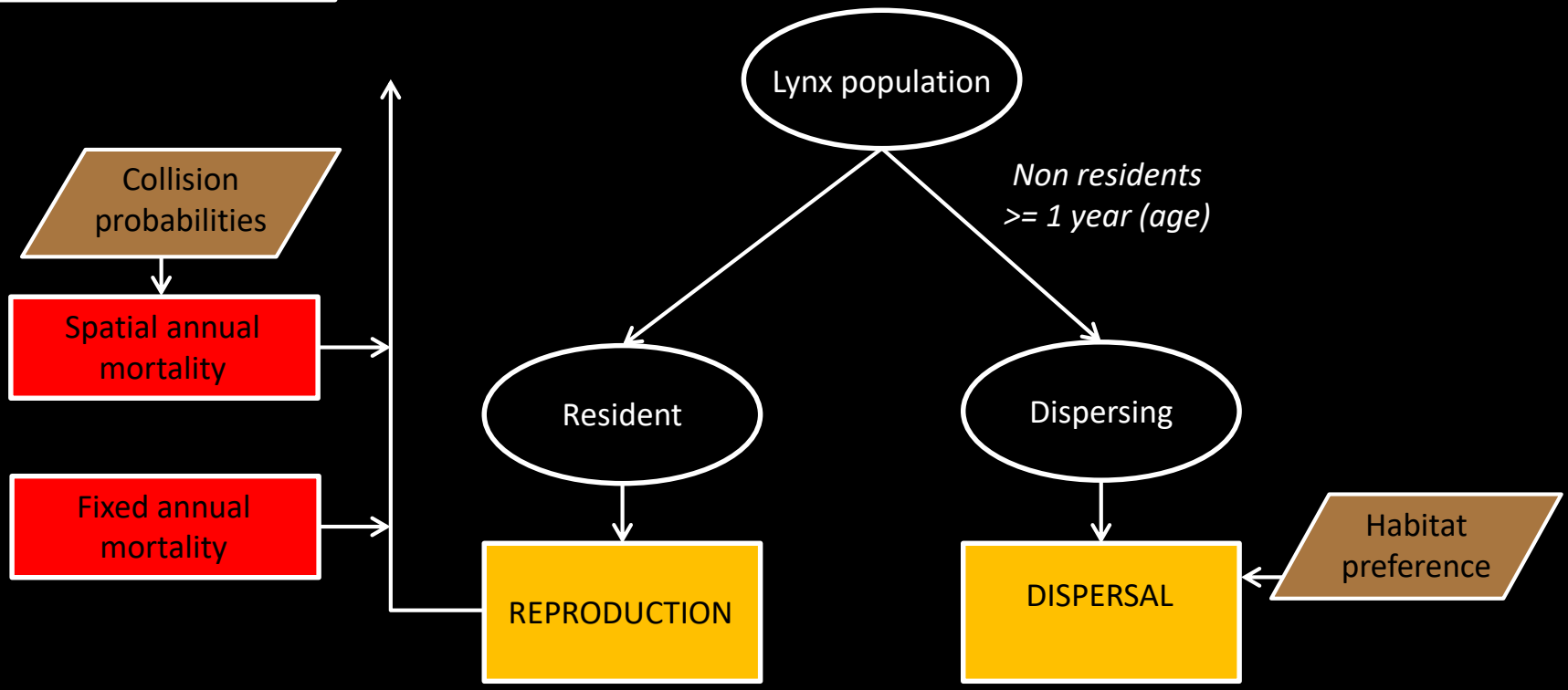

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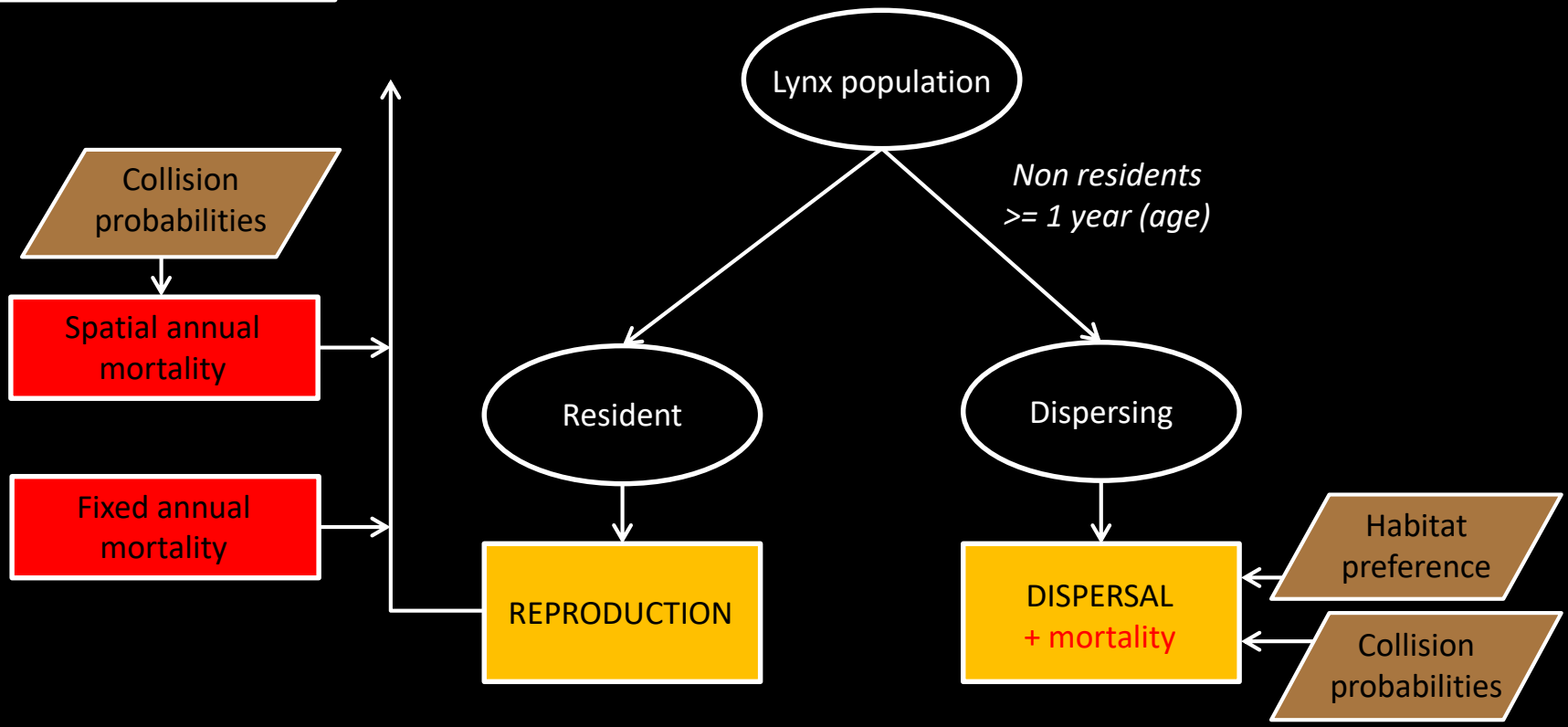

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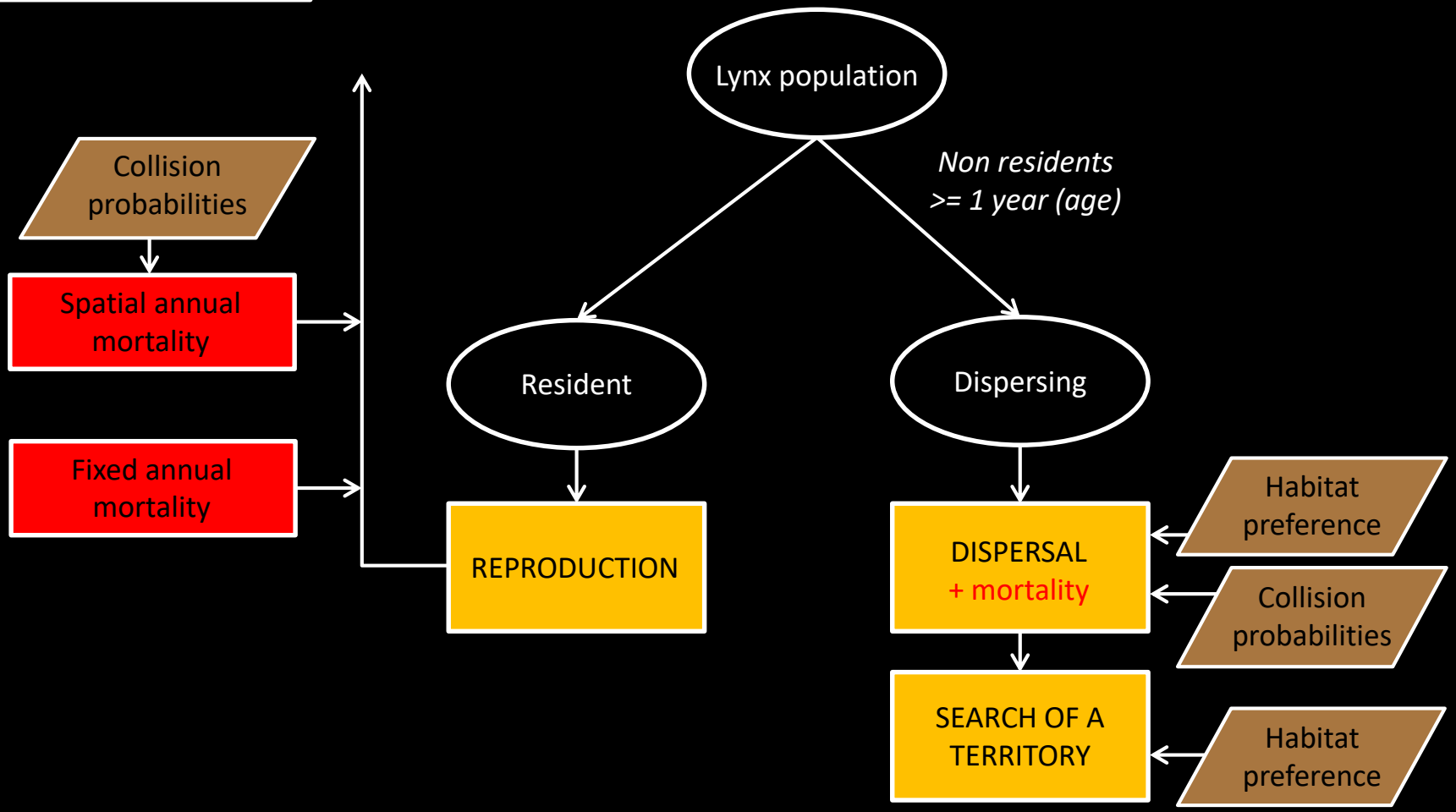

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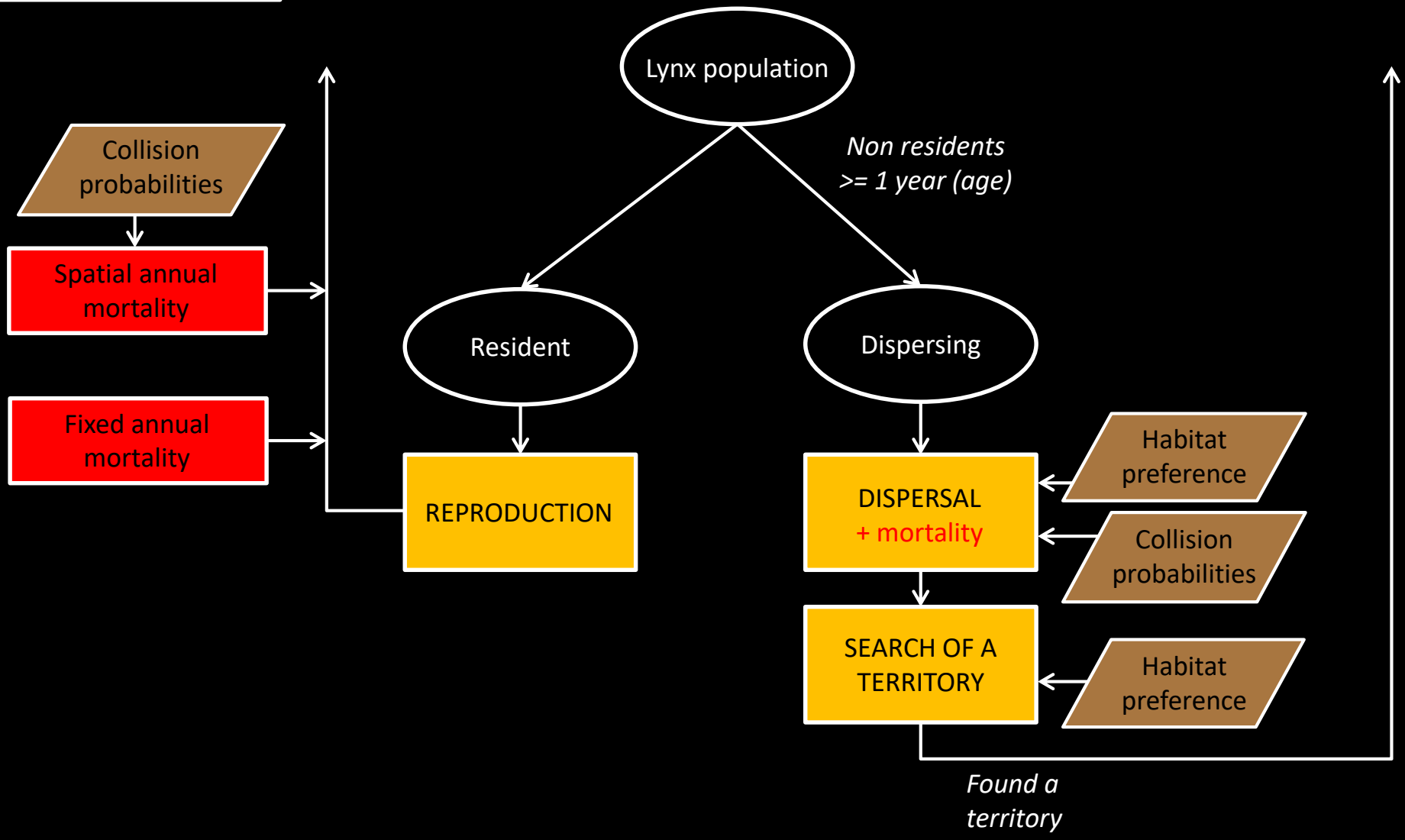

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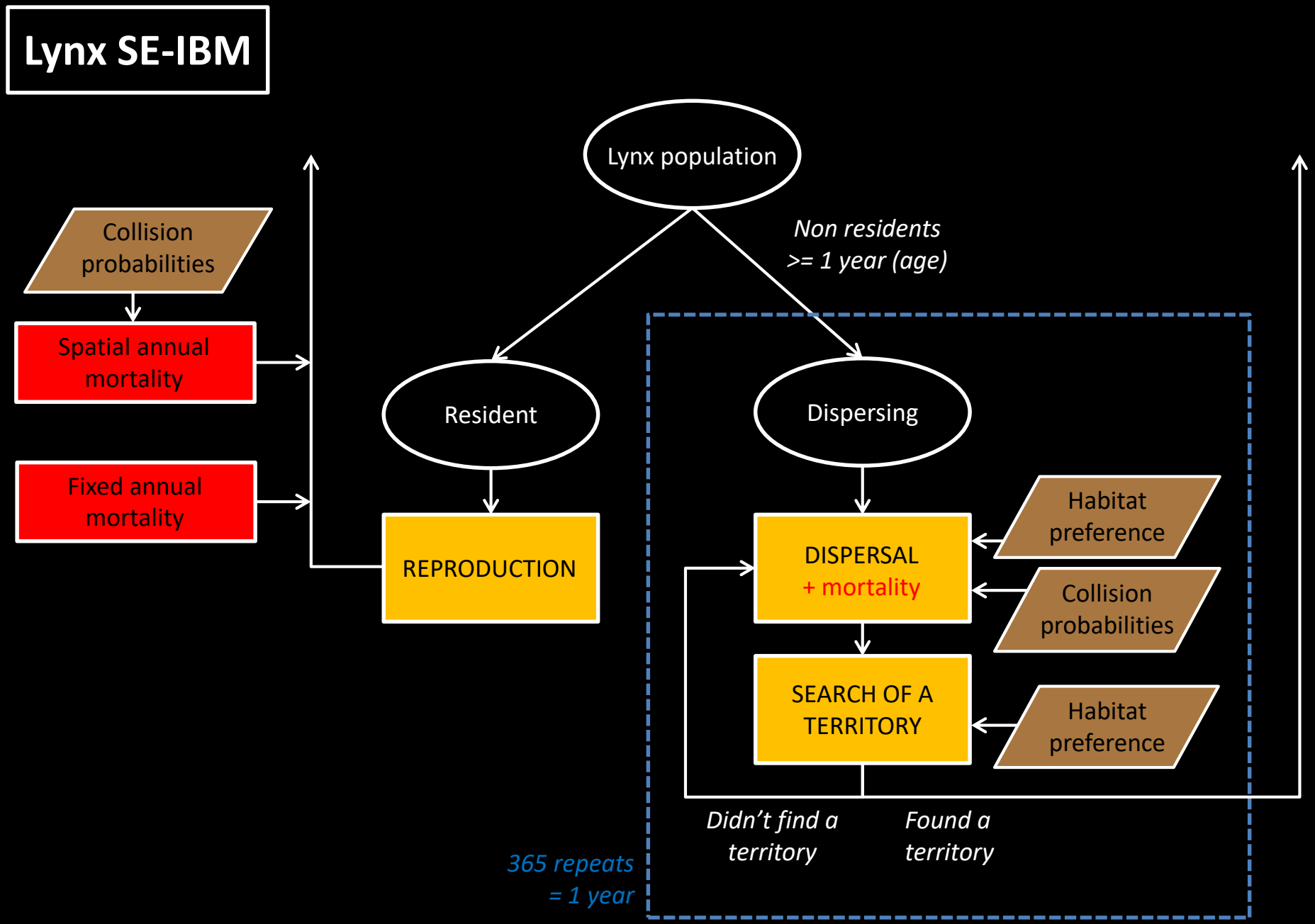

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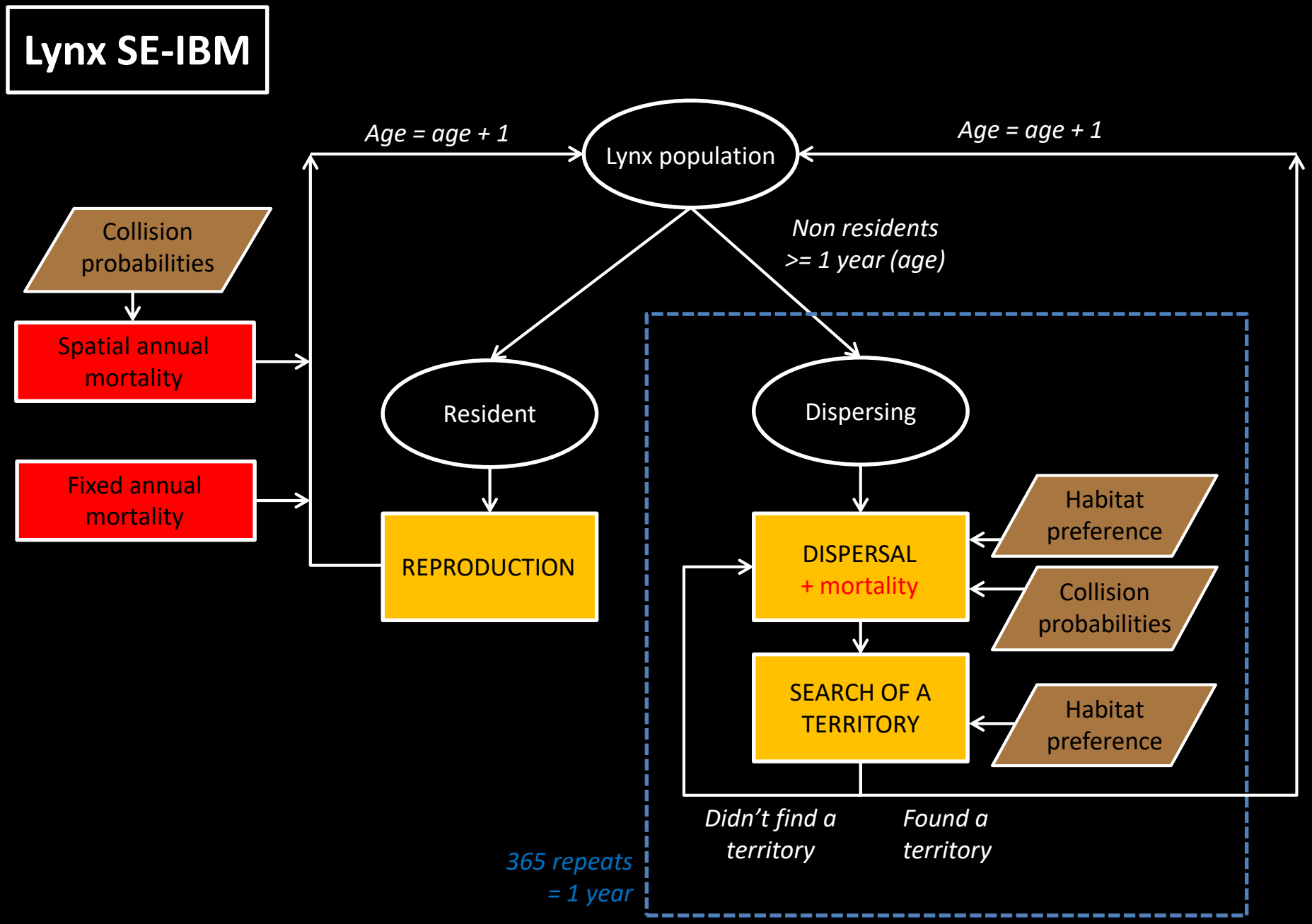

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NetLogoR

Bauduin et al. (2018)

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- R package to create and run SE-IBM on R
- Translation of NetLogo , does not call the software!

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NetLogoR

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- Translation of NetLogo , does not call the software!

- Provides classes
  - Landscape
  - Moving individuals
- And functions
  - Movement
  - Landscape/individual interactions
  - Population dynamics
  - …

Bauduin et al. (2018)

NetLogoR

- Advantages
  - Efficient framework
  - Easy and fast learning
  - Reduce mental switching cost between software
  - Can use multiple classes
  - Access to lots of packages and functions

Bauduin et al. (2018)

Implications for conservation

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- Test management actions
  - On transport infrastructures, land cover, initial lynx population
  - Impact on the lynx population in the future

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- Test management actions
  - On transport infrastructures, land cover, initial lynx population
  - Impact on the lynx population in the future
- Development of an interface
  - Shiny R package
  - Interactive and user-friendly
  - Co-construction with stakeholders

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Thank you!

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