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Spatial Networks: Population Persistence and Gene Flow

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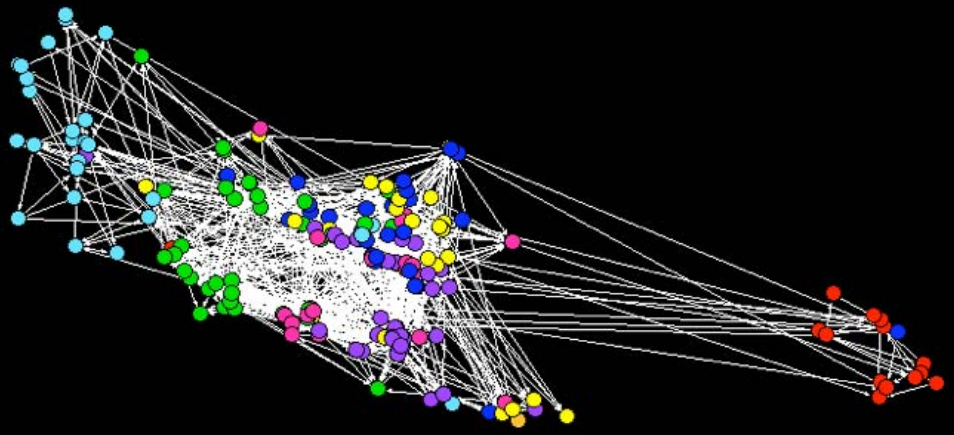
SPAIN

Spatial Networks: Population Persistence and Gene Flow



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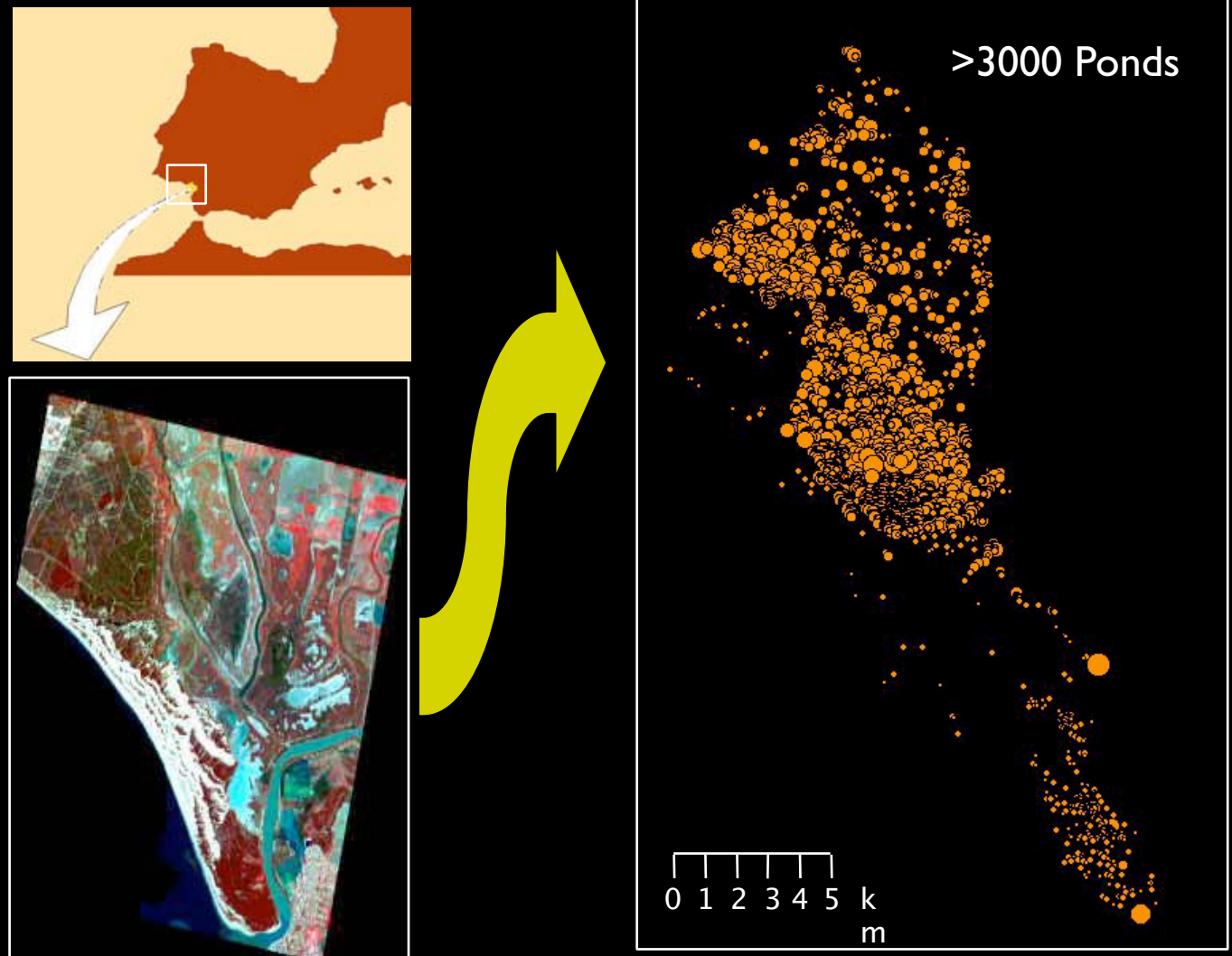
Outline

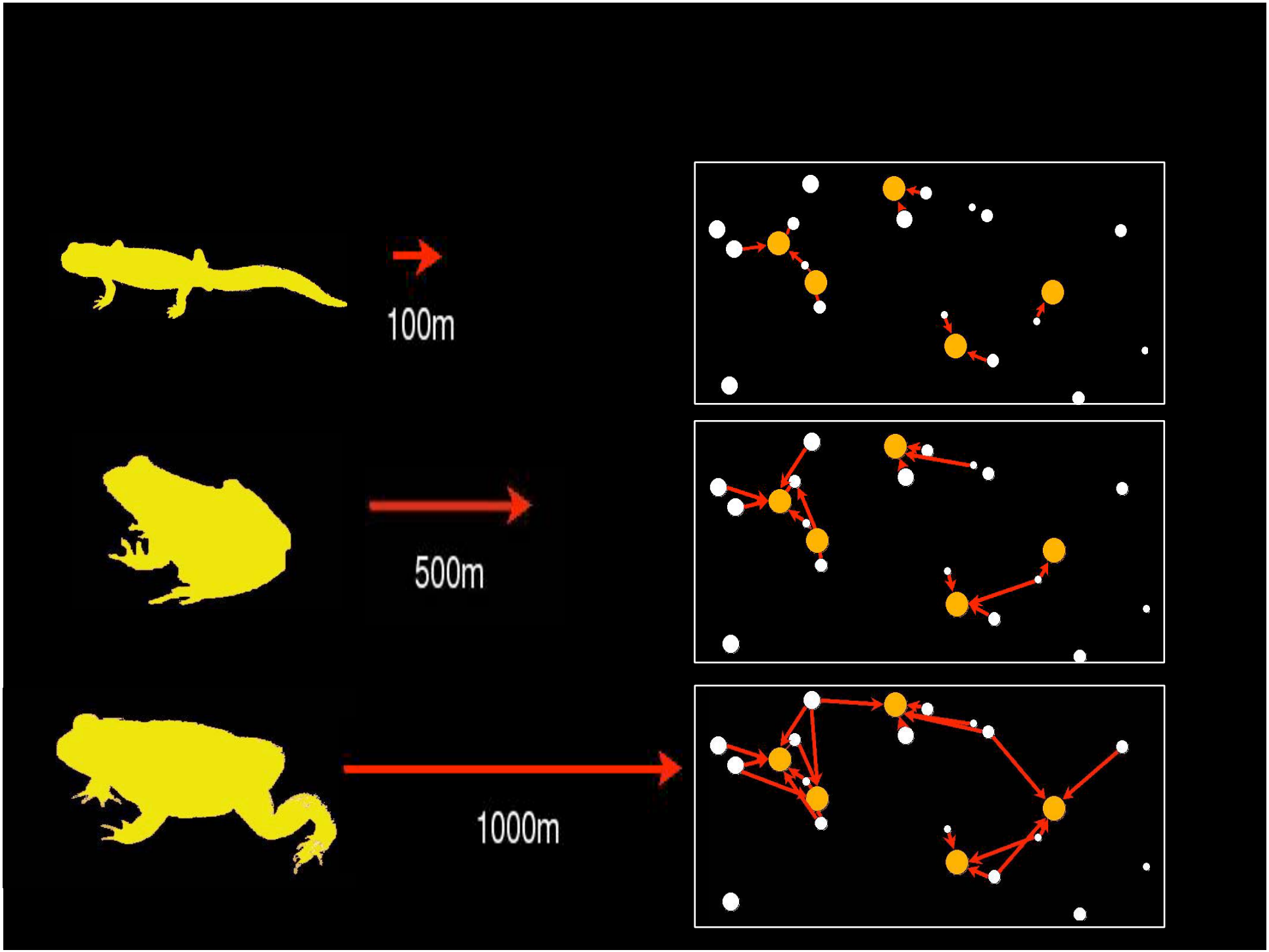
- 1. Describe Structure of Spatial Networks

- 2. Effects on Persistence, Gene Flow, and Genetic Diversity.

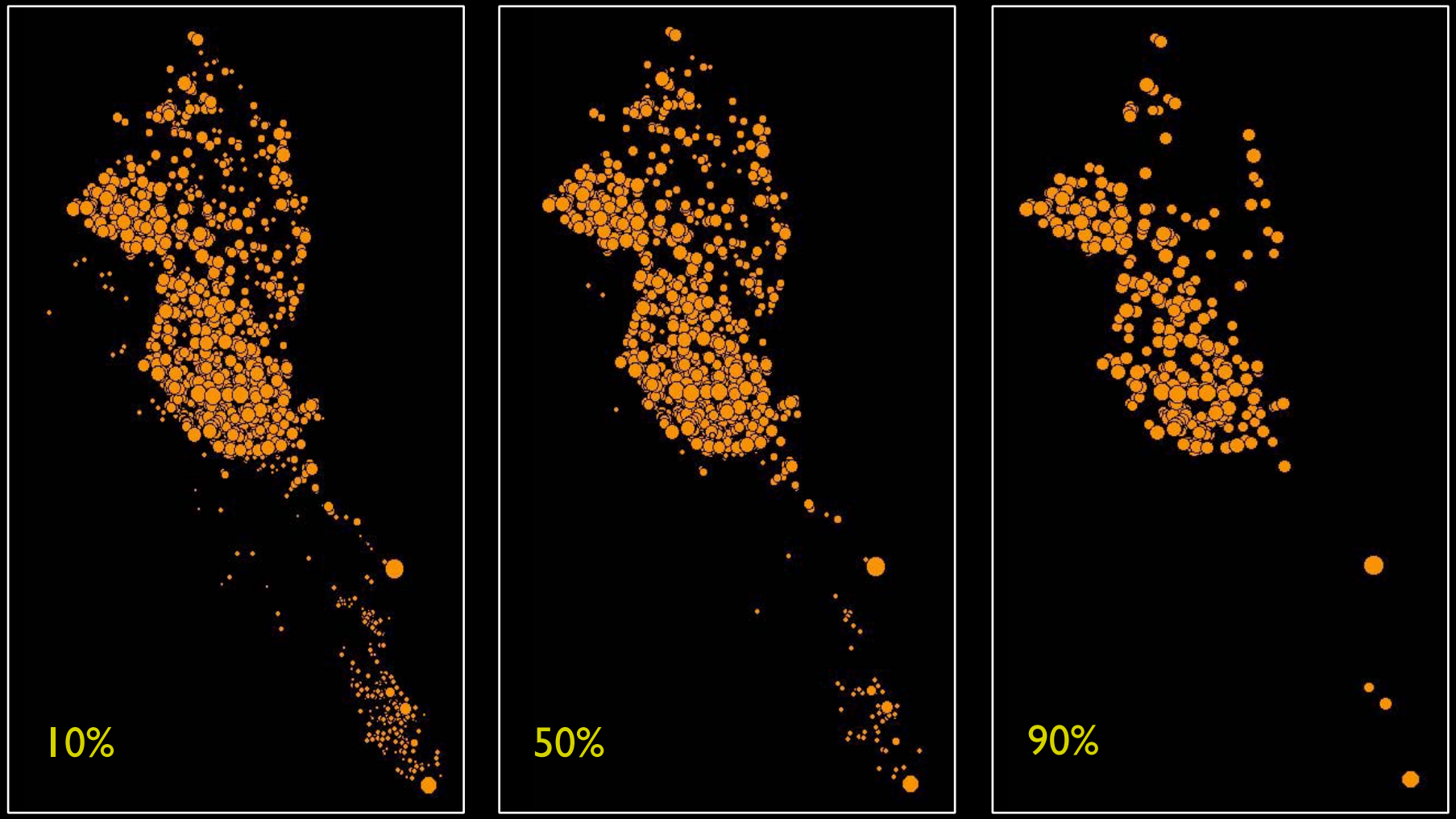
- *Case Studies:*
  - *Amphibian persistence in stochastic environments, Roosting sites in bats, Gene flow in a plant-pollinated plant, Forest patches.*

1. Network of Ponds in Doñana




100m
500m
1000m

Simulating Drought



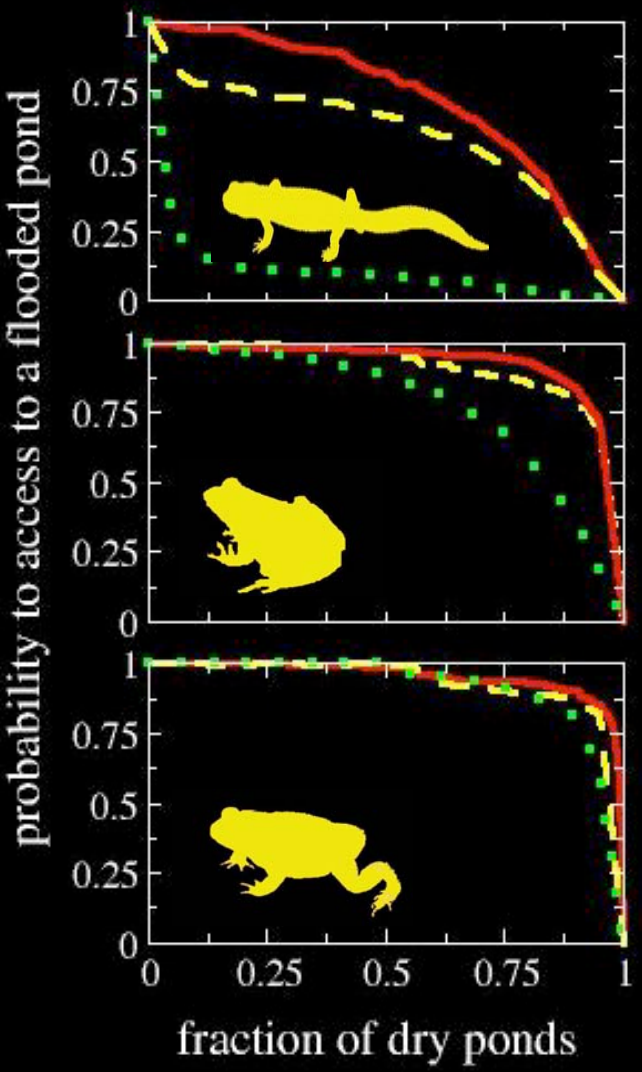
Fortuna, Gómez-Rodríguez, and Bascompte (2006) *Proc. R. Soc. London B* 273: 1429-1434

Amphibian Persistence

Real Spatial Network

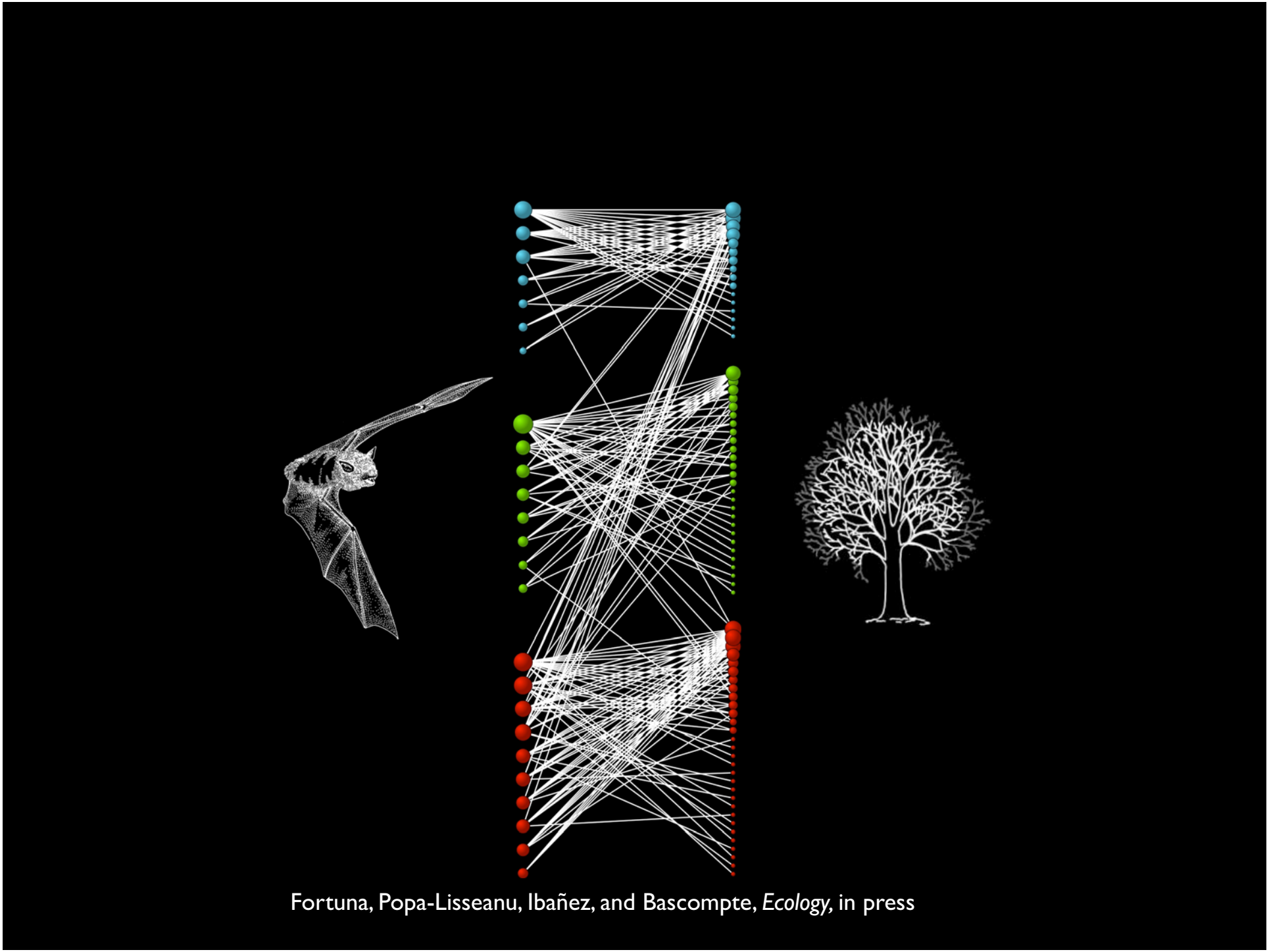
Pond Size Randomized

Pond Spatial Location Randomized

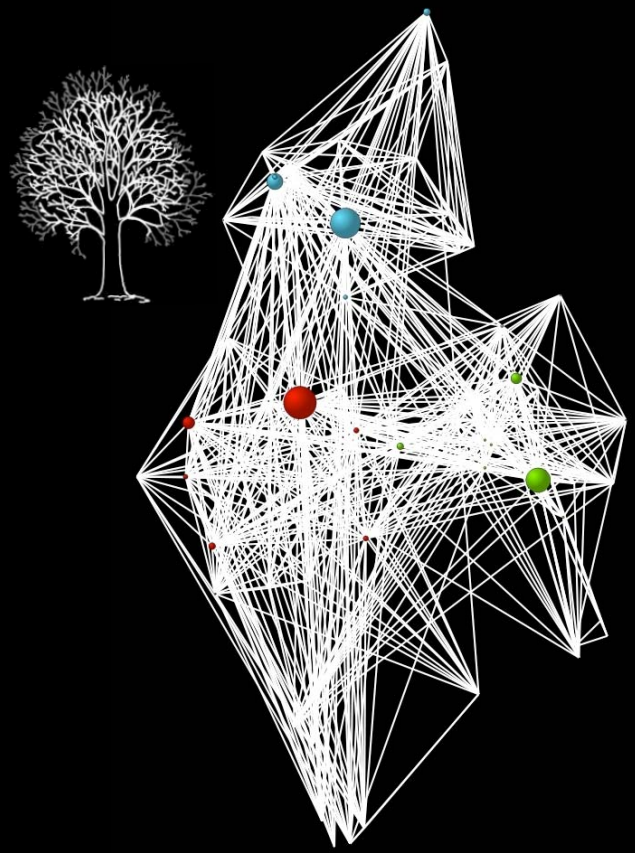


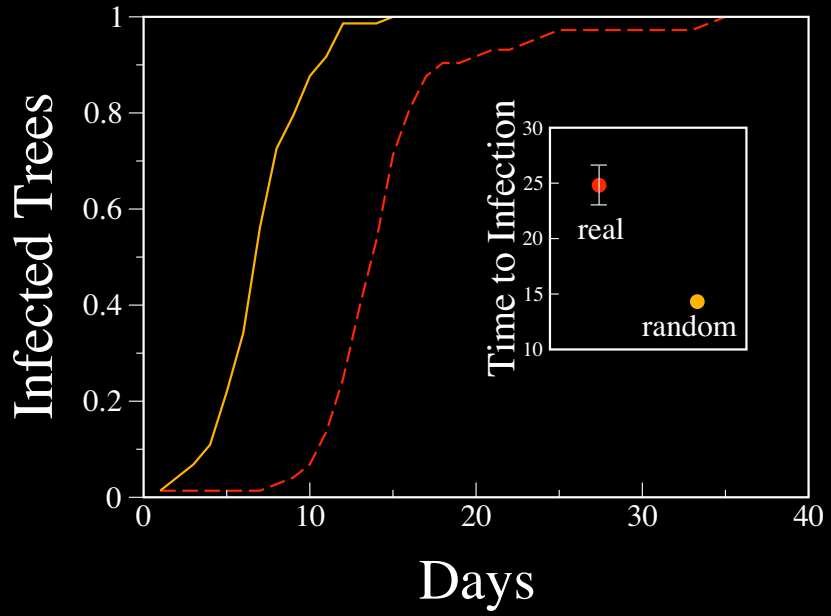
Fortuna, Gómez-Rodríguez, and Bascompte (2006) *Proc. R. Soc. London B* 273: 1429-1434

2. Network of Roosting Sites



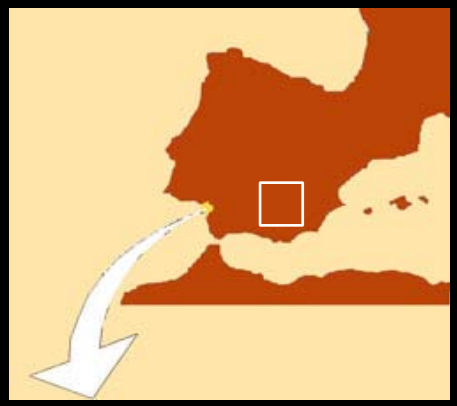
Fortuna, Popa-Lisseanu, Ibañez, and Bascompte, *Ecology,* in press

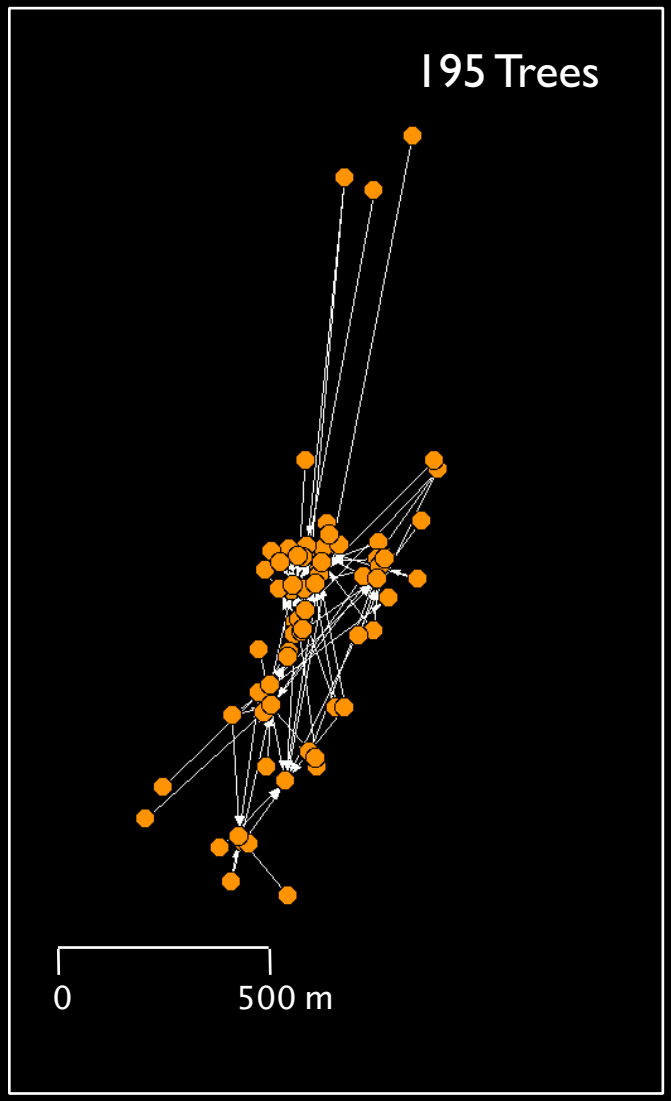


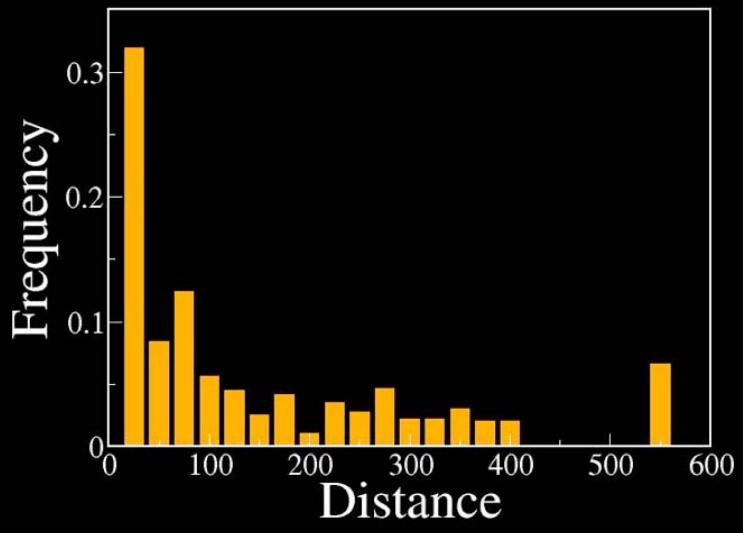


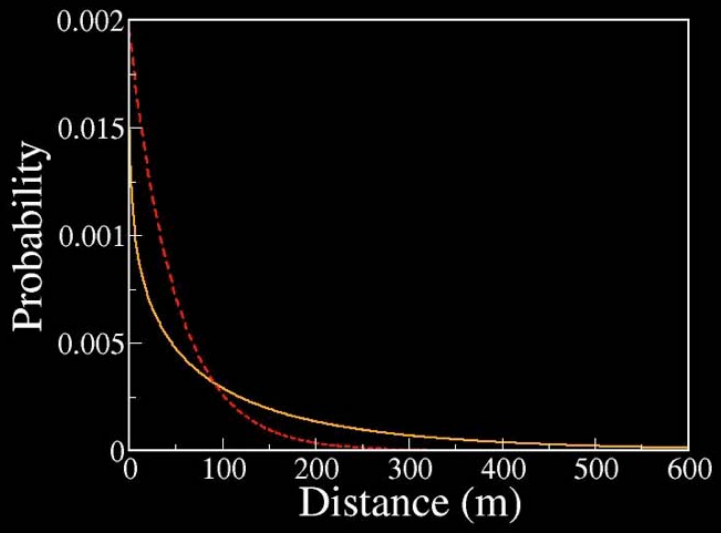
Fortuna, Popa-Lisseanu, Ibañez, and Bascompte, *Ecology*, in press

3. Mating Networks and Gene Flow

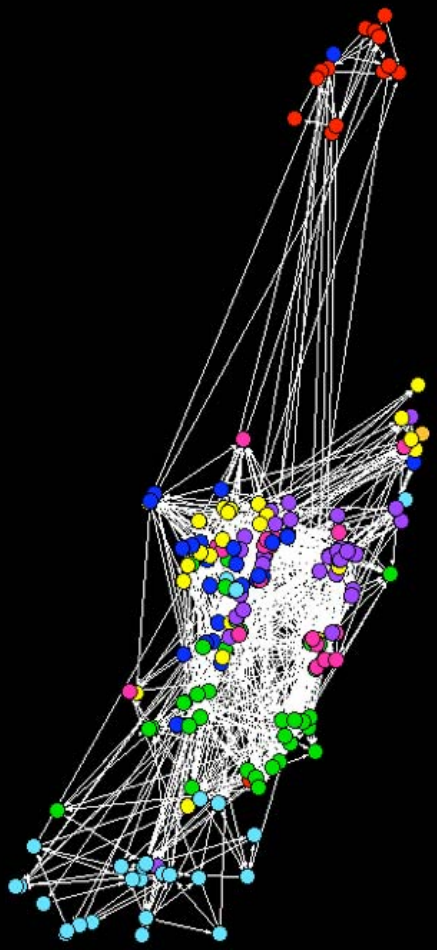




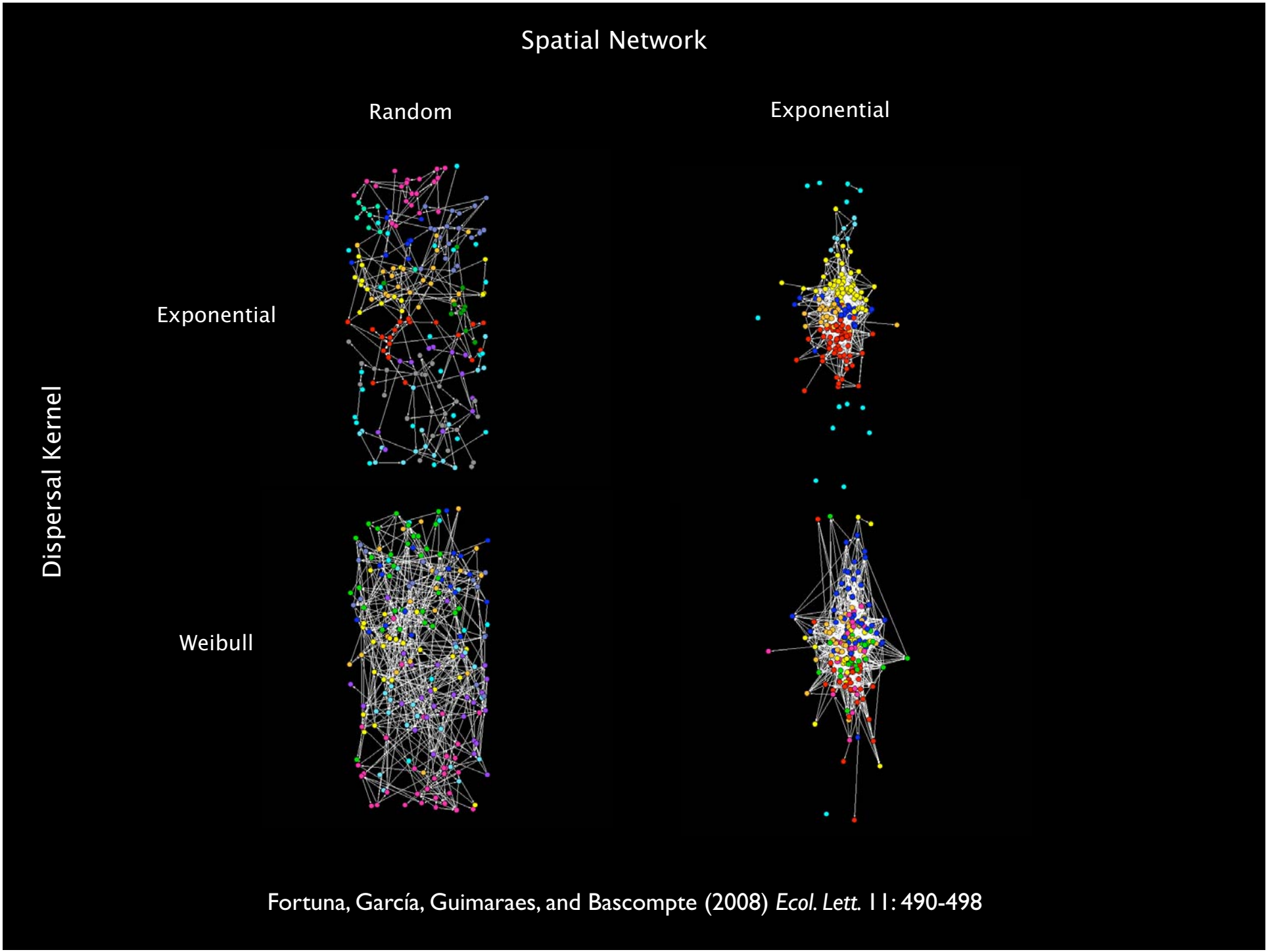




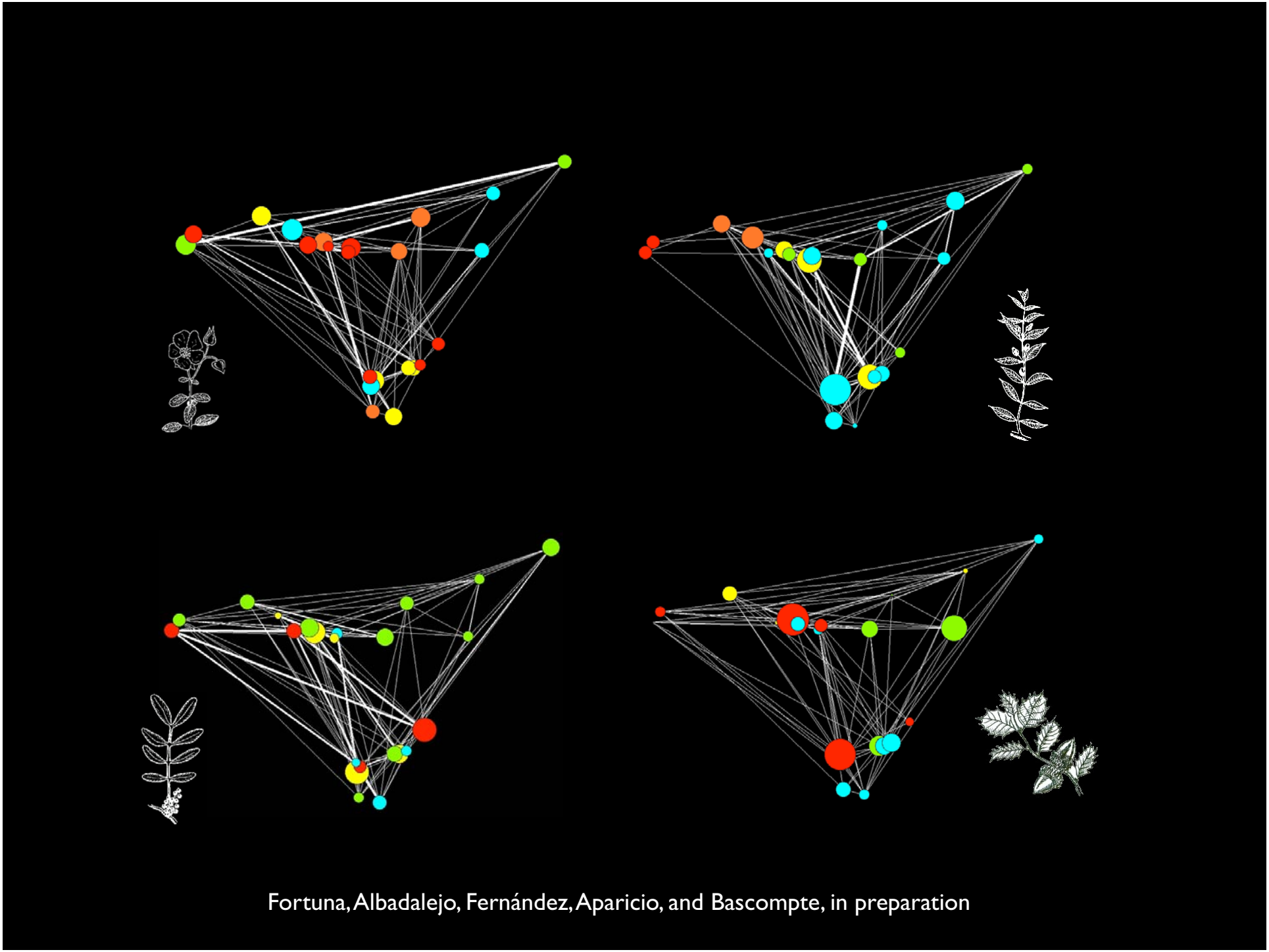
Fortuna, García, Guimaraes, and Bascompte (2008) *Ecol. Lett.* 11: 490-498



Fortuna, García, Guimaraes, and Bascompte (2008) *Ecol. Lett.* 11: 490-498

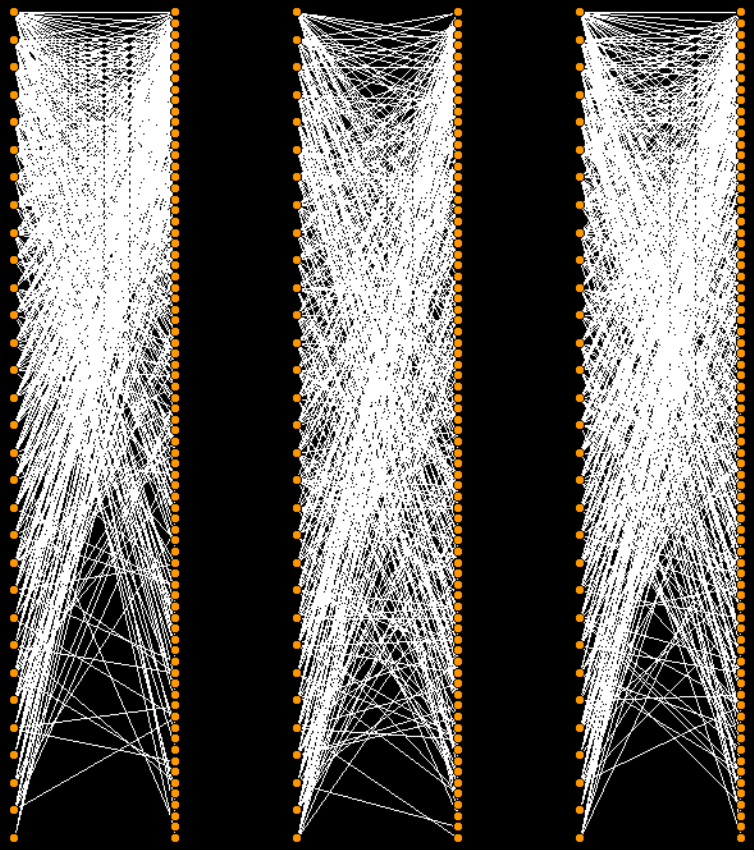

Spatial Network
Random
Exponential
Dispersal Kernel
Exponential
Weibull
Fortuna, García, Guimaraes, and Bascompte (2008) *Ecol. Lett.* 11: 490-498

4. Networks of Genetic Variation Across Species



Fortuna, Albadalejo, Fernández, Aparicio, and Bascompte, in preparation

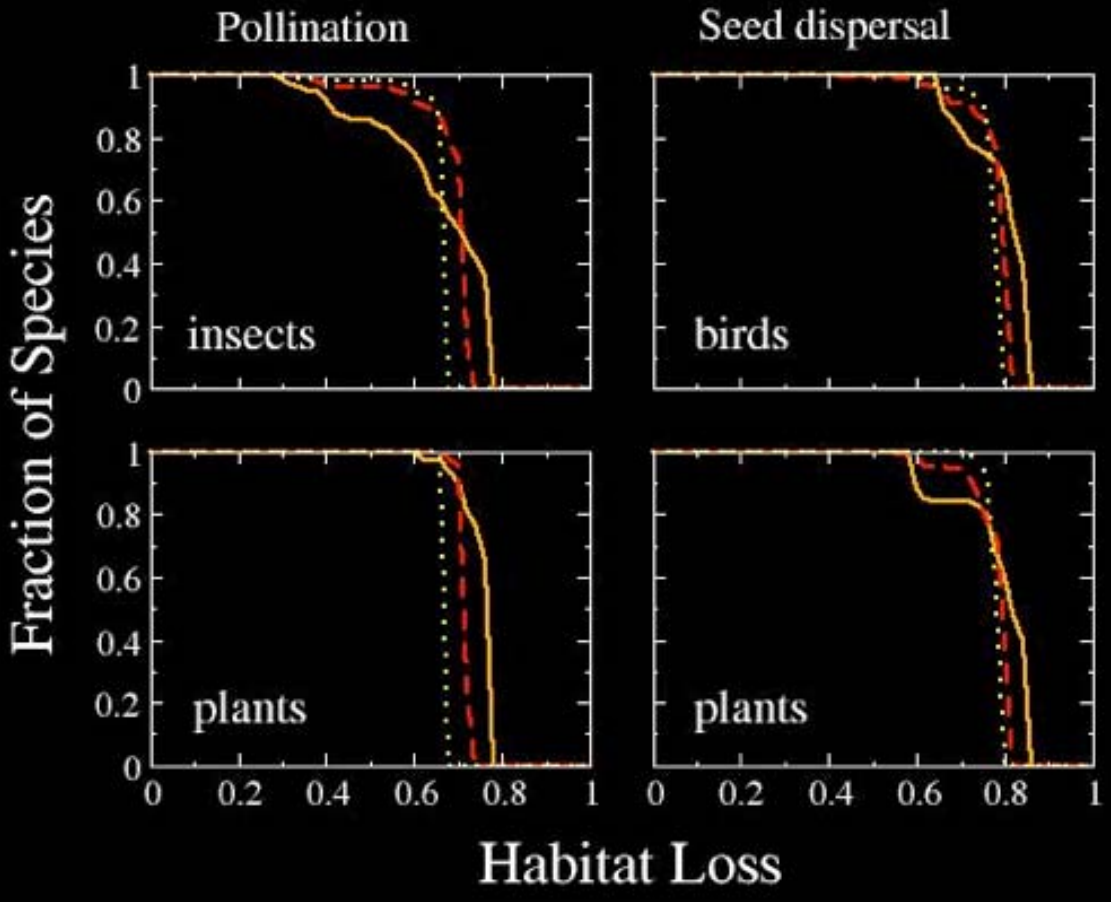
Spatial Networks of Mutualistic Networks



Real Random-1 Random-2

$$\begin{cases} \frac{dp}{dt} = c_{pa}(1-d-p) - e_p p \\ \frac{da}{dt} = c_a(p-a) - e_a a \end{cases}$$

Network Structure and Habitat Loss



Fortuna and Bascompte (2006). *Ecol. Lett.* 9: 281-286.

Conclusions

- Spatial network of ponds in Doñana is stable to drought and increases amphibian persistence.
- Roosting networks are organized in modules, which may slow down disease spread.
- Mating network of insect-pollinated plants determines gene flow.
- Networks of spatial genetic variation similarly organized in modules, but the role of each patch changes across species.

Acknowledgments

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Abelardo Aparicio

EURYI Awards
European Young Investigator

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EU VI Marco Framework

Spanish Ministry
of Education and Science