

UNIT 5: Competition

Outline

Introduction

Population model with competition

- Balanced competition

- Unbalanced competition

Population-level interactions

- Invasion theory

- Colonization and co-existence

Niches and coexistence

- The competitive exclusion principle

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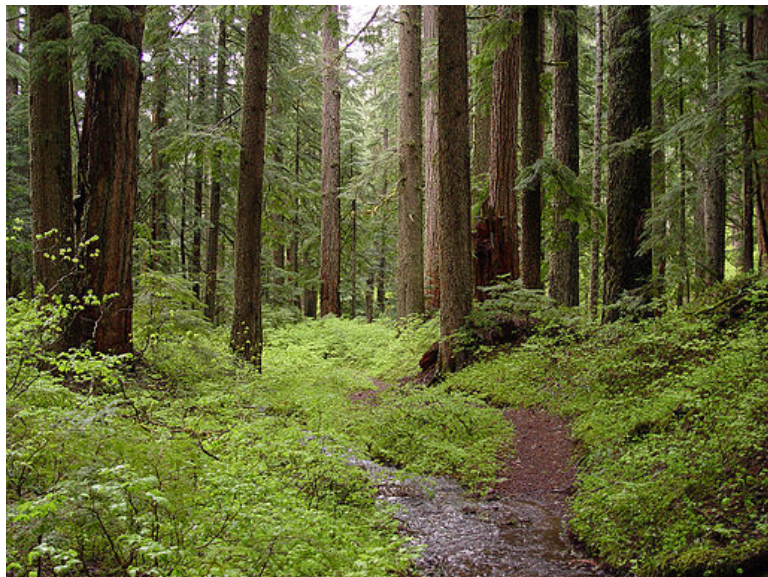
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Subsection 1

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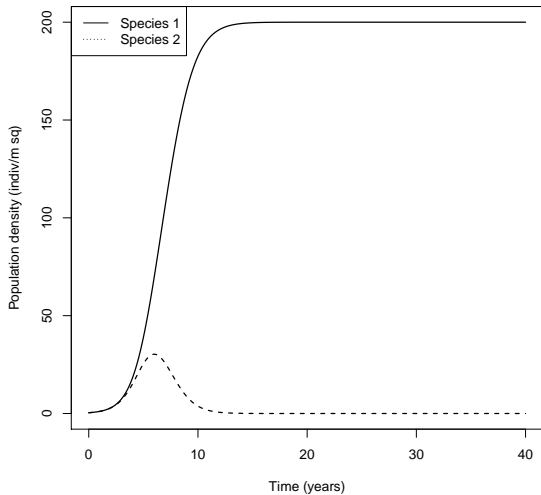
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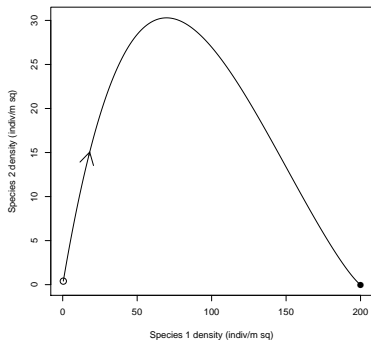
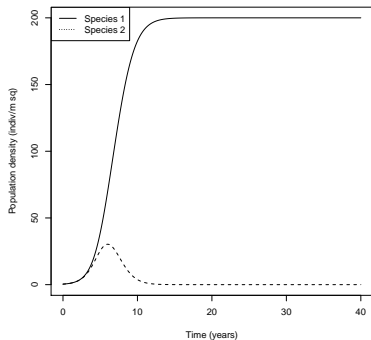
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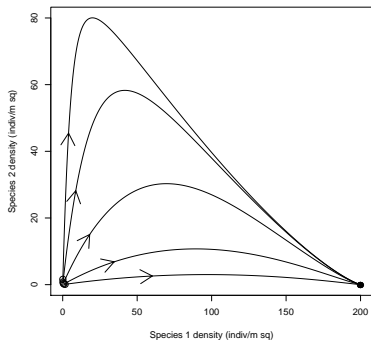
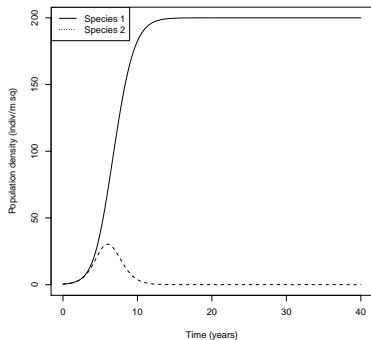
Dominance time plot



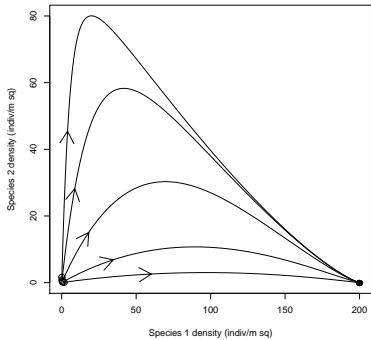
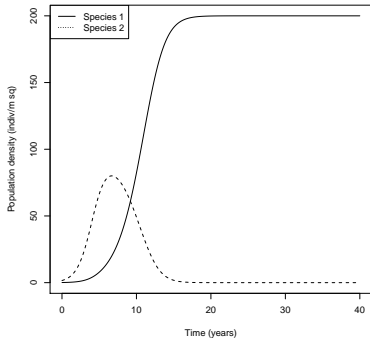
Dominance phase plot



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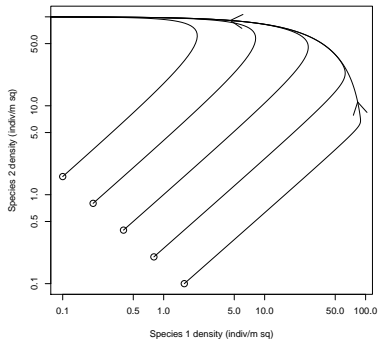
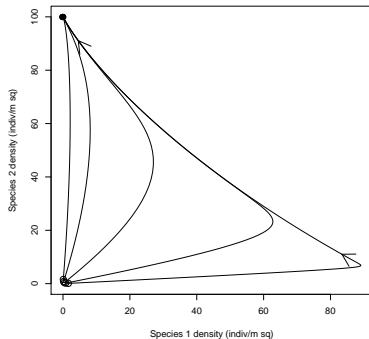
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Subsection 2

Unbalanced competition

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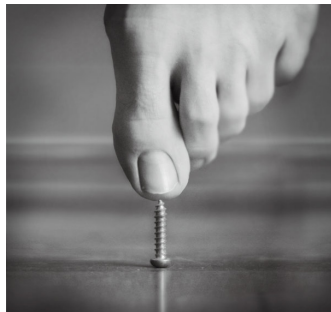
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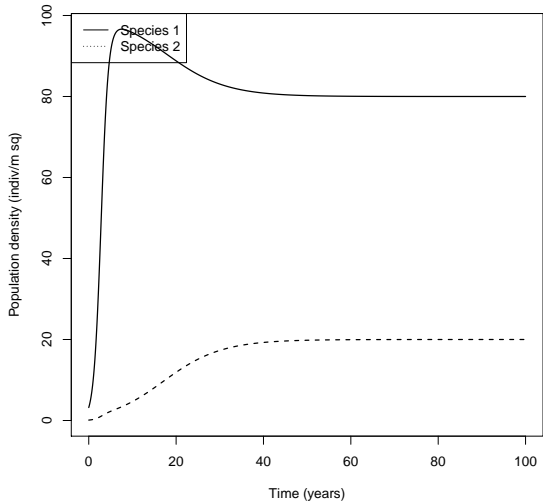
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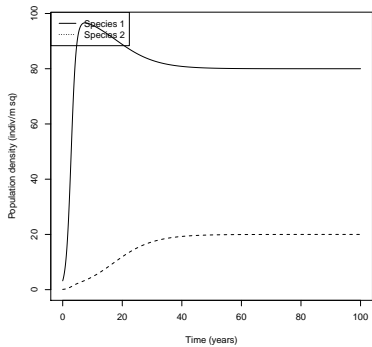
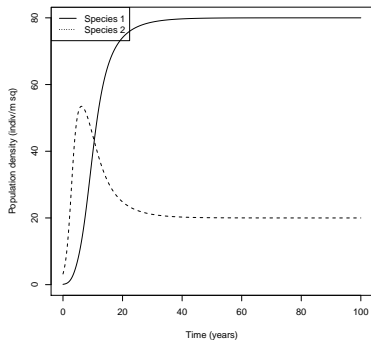
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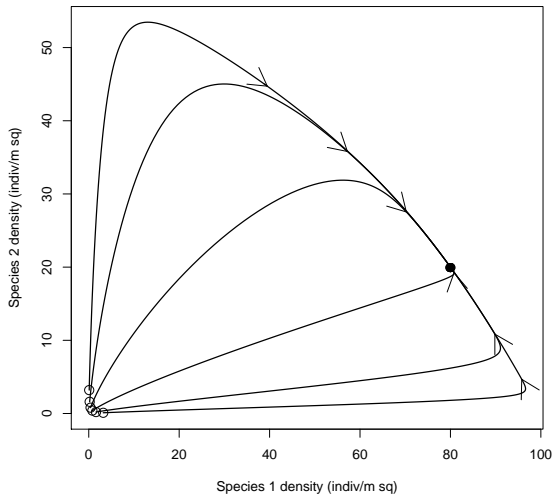
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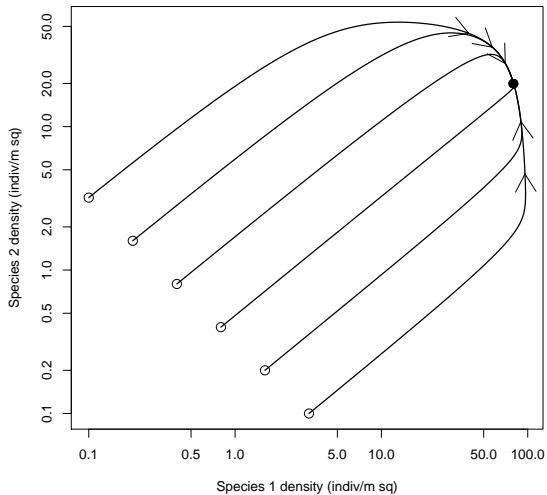
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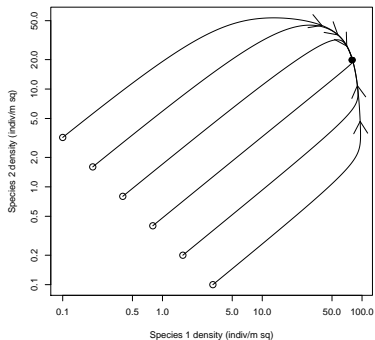
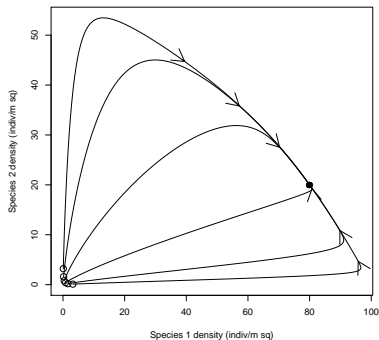
Coexistence phase plot



Coexistence phase plot (log scale)



Coexistence phase plots



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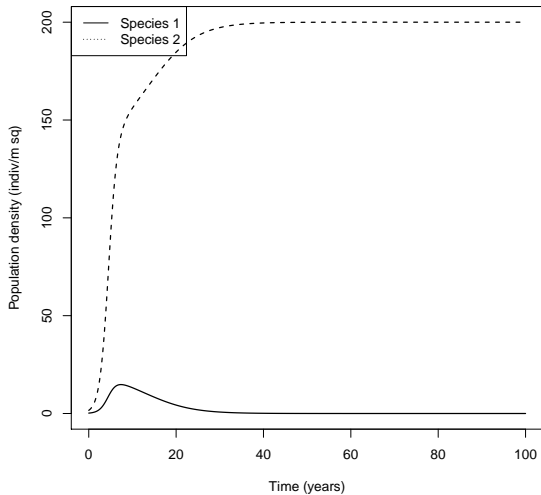
Co-operation

Founder control

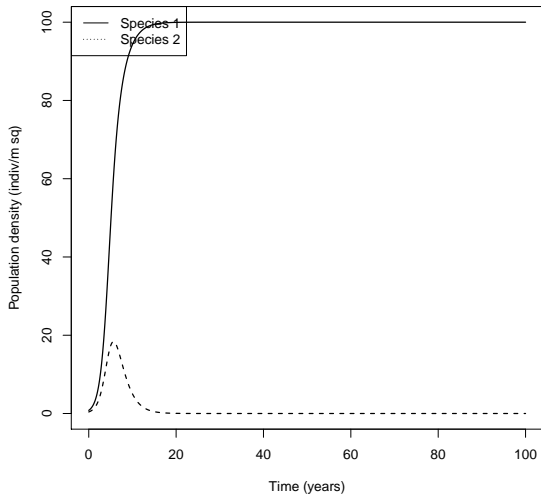


Changing the environment

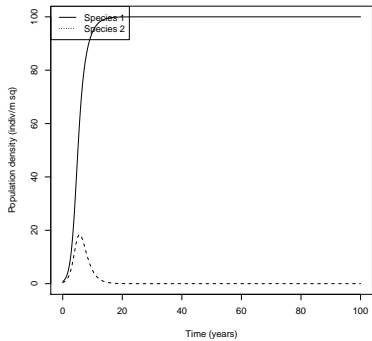
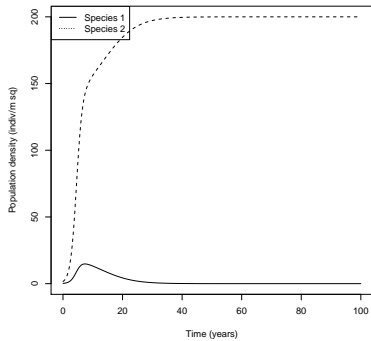
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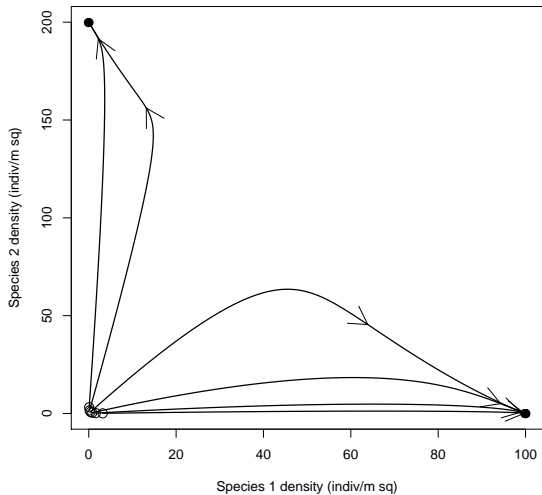
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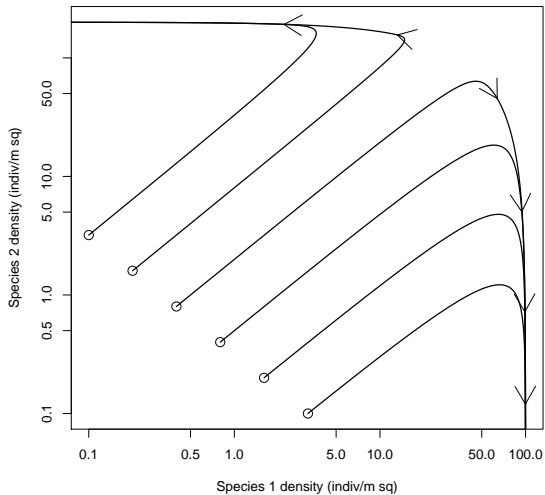
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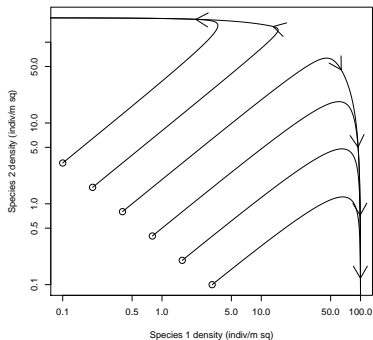
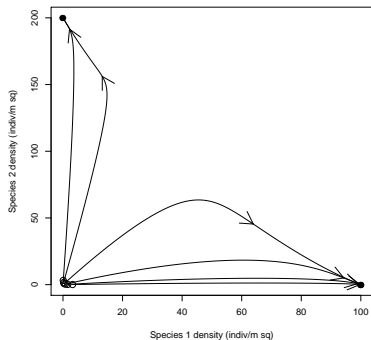
Founder control phase plot



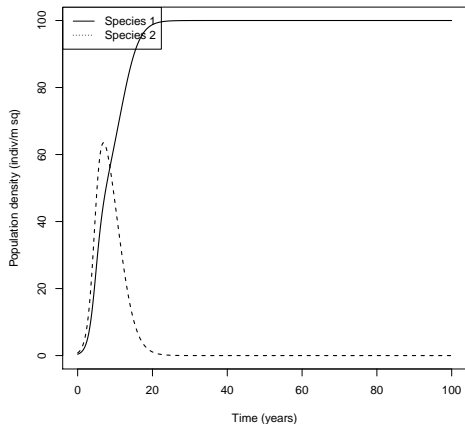
Founder control phase plot (log scale)



Founder control phase plots

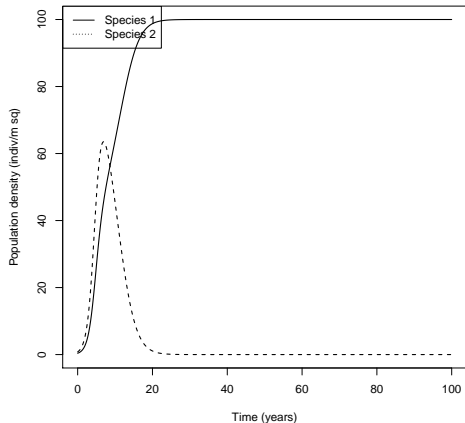


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Outline

Introduction

Population model with competition

Balanced competition

Unbalanced competition

Population-level interactions

Invasion theory

Colonization and co-existence

Niches and coexistence

The competitive exclusion principle

Subsection 1

Invasion theory

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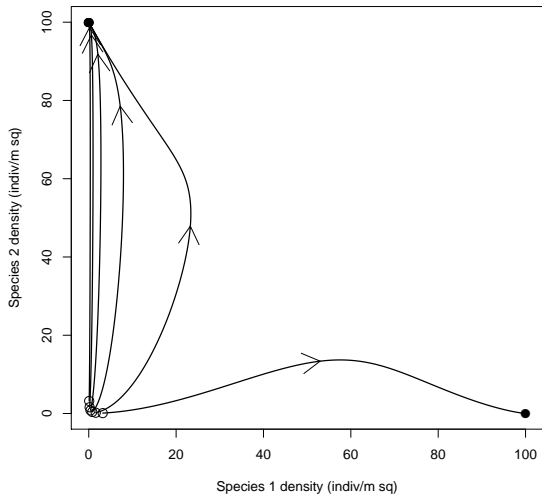
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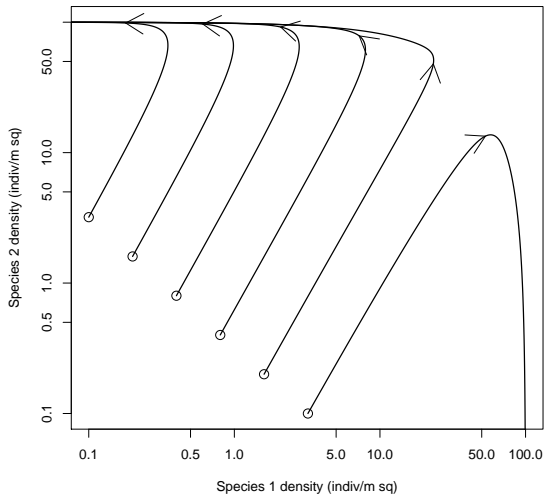
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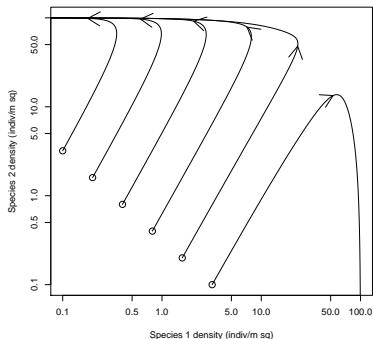
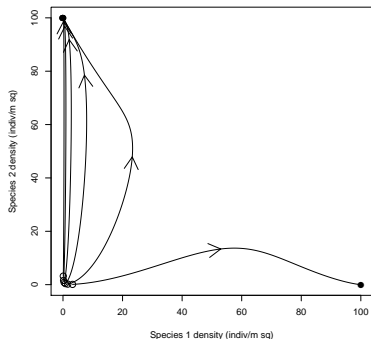
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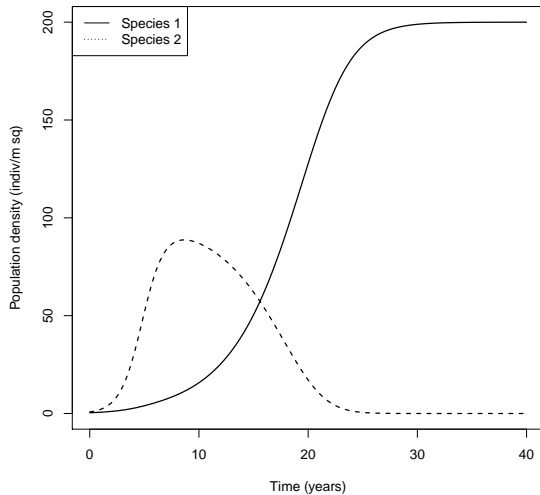
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- ▶ The maximum growth rate (for each species) is $r_0 = (b(0) - d(0))$:
 - ▶ * The net growth rate when crowding pressure is very low
- ▶ The species with the better r_0 should do better in the short run
 - ▶ Faster exponential growth
- ▶ If patches are very stable, then K species wins
- ▶ If they are very unstable, then r species wins
- ▶ In between, we get coexistence at the level of multiple populations

rK tradeoff



Outline

Introduction

Population model with competition

- Balanced competition

- Unbalanced competition

Population-level interactions

- Invasion theory

- Colonization and co-existence

Niches and coexistence

- The competitive exclusion principle

Ecological niches

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Subsection 1

The competitive exclusion principle

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