

# **RoLE Model User Guide**

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# Table of contents

<b>Preface</b>	<b>5</b>
<b>I Background</b>	<b>6</b>
<b>1 Process modeling in ecology and evolution</b>	<b>8</b>
<b>2 Models rolled into RoLE</b>	<b>9</b>
2.1 Ecological neutral theory . . . . .	9
2.2 Double-neutral ecological and population genetic drift . . . . .	9
2.3 Competitive coexistence . . . . .	9
2.4 Lotka-Volterra . . . . .	9
2.5 Island biogeography . . . . .	9
<b>3 RoLE Mission</b>	<b>10</b>
3.1 Scientific vision . . . . .	10
3.2 Operating principles . . . . .	10
3.3 Code of Conduct . . . . .	10
<b>II How a RoLE model works</b>	<b>11</b>
<b>4 Components of a RoLE model</b>	<b>13</b>
4.1 Metacommunity . . . . .	13
4.1.1 Species, traits, phylogeny, genetics . . . . .	13
4.2 Local community . . . . .	13
4.2.1 Species, traits, phylogeny, genetics . . . . .	13
<b>5 Model inputs: Setting the stage</b>	<b>14</b>
5.1 Parameter inputs . . . . .	14
5.2 Pre-set configurations . . . . .	14
<b>6 Timestep-to-timestep</b>	<b>15</b>
6.1 Deaths . . . . .	15
6.2 Birth and immigration . . . . .	15
6.3 Speciation . . . . .	15

6.4	Trait change . . . . .	15
6.5	Phylogenetics . . . . .	15
6.6	Population genetics . . . . .	15
<b>7</b>	<b>Model results</b>	<b>16</b>
7.1	Raw community state . . . . .	16
7.2	Summary statistics . . . . .	16
<b>8</b>	<b>Introduction</b>	<b>17</b>
<b>III</b>	<b>Running RoLE models</b>	<b>18</b>
<b>9</b>	<b>Installation</b>	<b>20</b>
9.1	Compiled binaries . . . . .	20
9.2	From source . . . . .	20
<b>10</b>	<b>RoLE Shiny</b>	<b>21</b>
10.1	Installation . . . . .	21
10.2	Access . . . . .	21
10.3	Using . . . . .	21
10.4	Saving results . . . . .	21
<b>11</b>	<b>Your first RoLE model</b>	<b>22</b>
11.1	Model specification . . . . .	22
11.2	Running . . . . .	22
11.3	Results and interpretation . . . . .	22
<b>12</b>	<b>RoLE Experiments</b>	<b>23</b>
12.1	RoLE Experiments . . . . .	23
<b>13</b>	<b>Reproducibility</b>	<b>24</b>
13.1	Stochasticity and non-repeatability . . . . .	24
13.2	Storing model results . . . . .	24
<b>14</b>	<b>(Not implemented) RoLE models at scale</b>	<b>25</b>
14.1	Parallel and cluster computing . . . . .	25
<b>IV</b>	<b>Use cases</b>	<b>26</b>
<b>15</b>	<b>RoLE Models for In-Silico Exploration</b>	<b>28</b>
<b>16</b>	<b>Linking pattern to process in empirical data</b>	<b>29</b>
16.1	Many-to-one mapping . . . . .	29

16.2 Likelihood-free inference . . . . .	29
16.3 Worked example . . . . .	29
<b>17 RoLE in the Classroom</b>	<b>30</b>
<b>V Troubleshooting</b>	<b>31</b>
<b>18 Contact</b>	<b>33</b>

# Preface

This is a user guide for working with the RoLE model, which includes the roleR and roleShiny R packages.

# **Part I**

## **Background**

What is the RoLE Model? Who is involved? What are these packages?

# 1 Process modeling in ecology and evolution

What is process modeling? Why do we use it for eco-evo



## **2 Models rolled into RoLE**

The RoLE model implements versions of a number of established models.

### **2.1 Ecological neutral theory**

### **2.2 Double-neutral ecological and population genetic drift**

### **2.3 Competitive coexistence**

### **2.4 Lotka-Volterra**

### **2.5 Island biogeography**

## **3 RoLE Mission**

### **3.1 Scientific vision**

### **3.2 Operating principles**

### **3.3 Code of Conduct**

## **Part II**

# **How a RoLE model works**

No code, high level narrative (or visuals!) of what happens in a RoLE model.

## **4 Components of a RoLE model**

### **4.1 Metacommunity**

#### **4.1.1 Species, traits, phylogeny, genetics**

### **4.2 Local community**

#### **4.2.1 Species, traits, phylogeny, genetics**

## **5 Model inputs: Setting the stage**

### **5.1 Parameter inputs**

### **5.2 Pre-set configurations**

## **6 Timestep-to-timestep**

What happens when the model actually runs?

### **6.1 Deaths**

### **6.2 Birth and immigration**

### **6.3 Speciation**

### **6.4 Trait change**

### **6.5 Phylogenetics**

### **6.6 Population genetics**

## **7 Model results**

What are the results of a role model?

### **7.1 Raw community state**

### **7.2 Summary statistics**



## 8 Introduction

This is a book created from markdown and executable code.

See Knuth (1984) for additional discussion of literate programming.

```
1 + 1
```

```
[1] 2
```

## **Part III**

# **Running RoLE models**

Ok, how do I actually play with RoLE?

## **9 Installation**

### **9.1 Compiled binaries**

### **9.2 From source**

## **10 RoLE Shiny**

### **10.1 Installation**

### **10.2 Access**

### **10.3 Using**

### **10.4 Saving results**

# **11 Your first RoLE model**

## **11.1 Model specification**

## **11.2 Running**

## **11.3 Results and interpretation**

## **12 RoLE Experiments**

### **12.1 RoLE Experiments**

# **13 Reproducibility**

## **13.1 Stochasticity and non-repeatability**

## **13.2 Storing model results**



## **14 (Not implemented) RoLE models at scale**

### **14.1 Paralell and cluster computing**

# **Part IV**

## **Use cases**

Overview of main (foreseen) use cases for RoLE.

# 15 RoLE Models for In-Silico Exploration

Generate and test hypotheses for how different types of conditions/interventions affect model outcomes.

## **16 Linking pattern to process in empirical data**

### **16.1 Many-to-one mapping**

### **16.2 Likelihood-free inference**

### **16.3 Worked example**

# **17 RoLE in the Classroom**

Tips, tricks, and sample curricula from using RoLE as a teaching tool.

**Part V**

**Troubleshooting**

What to do when it doesn't run.



## 18 Contact

We respond to GitHub issues!

Knuth, Donald E. 1984. “Literate Programming.” *Comput. J.* 27 (2): 97–111. <https://doi.org/10.1093/comjnl/27.2.97>.