Update - Integrating telemetry in SCR to improve estimation of the cost function

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Background

Model structure

Integrated likelihood framework

- Single model, composed of SCR and movement submodels
- Submodels share 2 params:
  - α_2 - Cost parameter
  - σ - Distance from home range center
- Leverages SCR data and telemetry data

Submodels

The SCR model

- Basic SCR model (w/ Gaussian encounter probability model)
- Modified to estimate cost (Royle *et al.* 2013)

The movement model (Sutherland *et al.* 2018 TWS presentation)

- Basic model of Markovian movement
  - Step length determined by LCP (ecological) distance
  - Includes distance from activity center for SCR-like data
  - So, four params:

Parameter	Description
α_2	Cost value
σ	Space use - home range
υ	Space use - step length
ψ	pr(Moved)

SCR_{cost} (base, no telem)

Scenario settings

SCR DATA

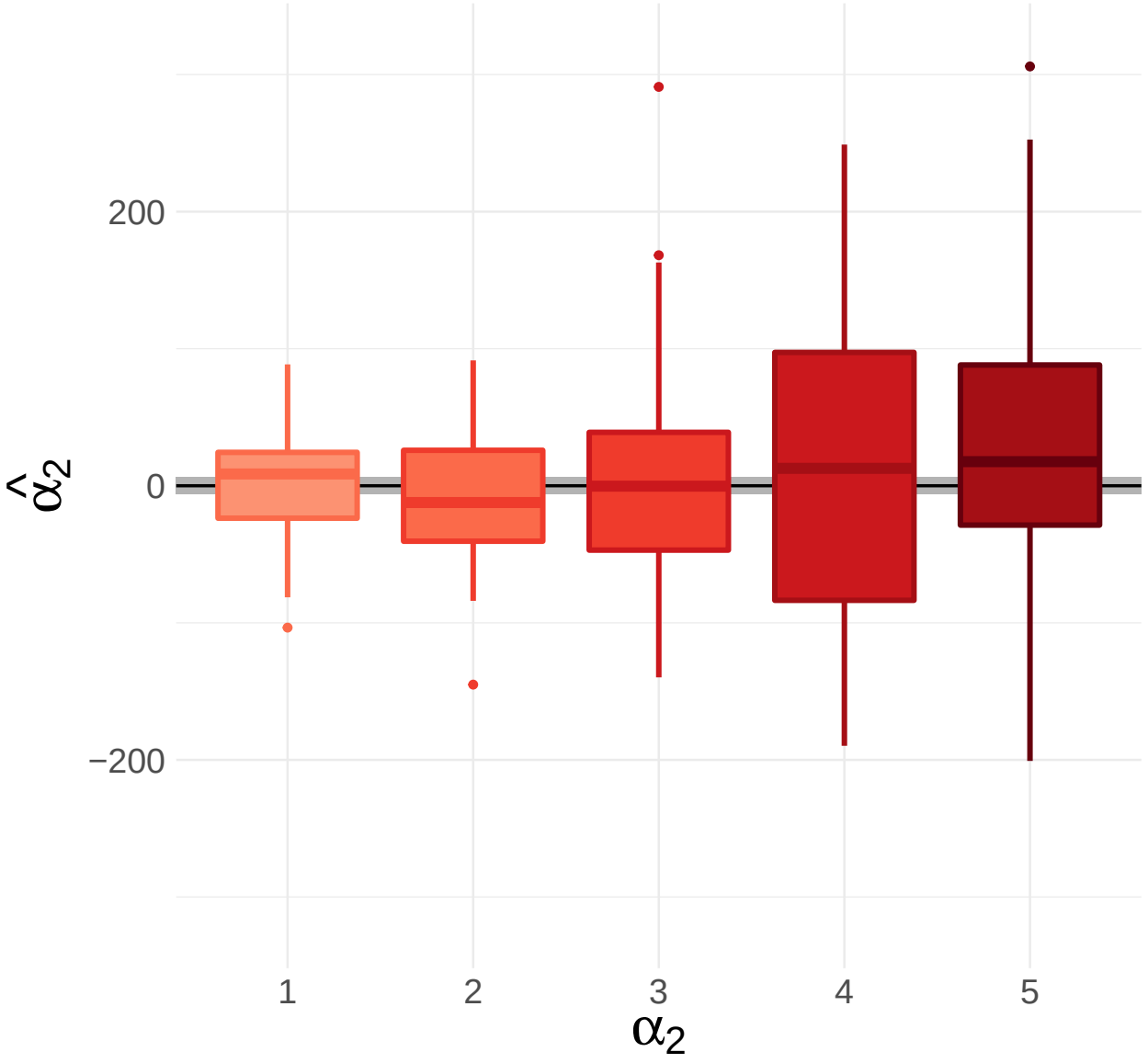
Parameter	Value	Description
abundance	300	Abundance
alpha2	1,2,3,4,5	Cost value
sigma	0.5	Space use - home range
p0	0.2	Baseline encounter probability
K	5	Number of sampling occasions

STATE-SPACE

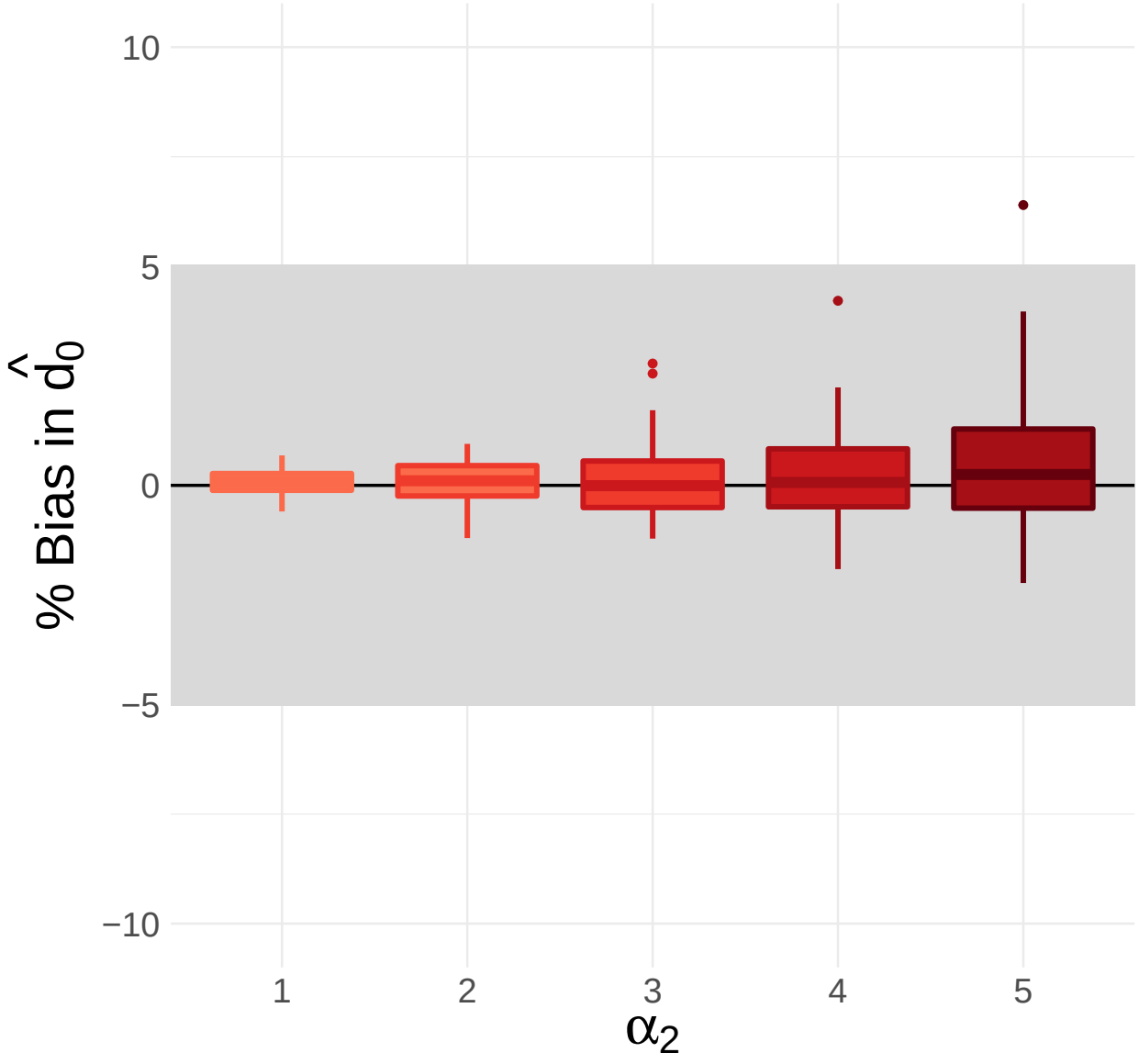
Parameter	Value	Description
rr	sigma/4	State-space & cost resolution
lncol = lnrow	10/rr	State-space dimensions
d0	abundance/(lncol*lnrow)	Per-pixel density

50 simulations per cost value

Cost estimation



Density estimation



SCR_{cost} + **telem**

Scenario settings

SCR DATA:

- Same as above

STATE-SPACE:

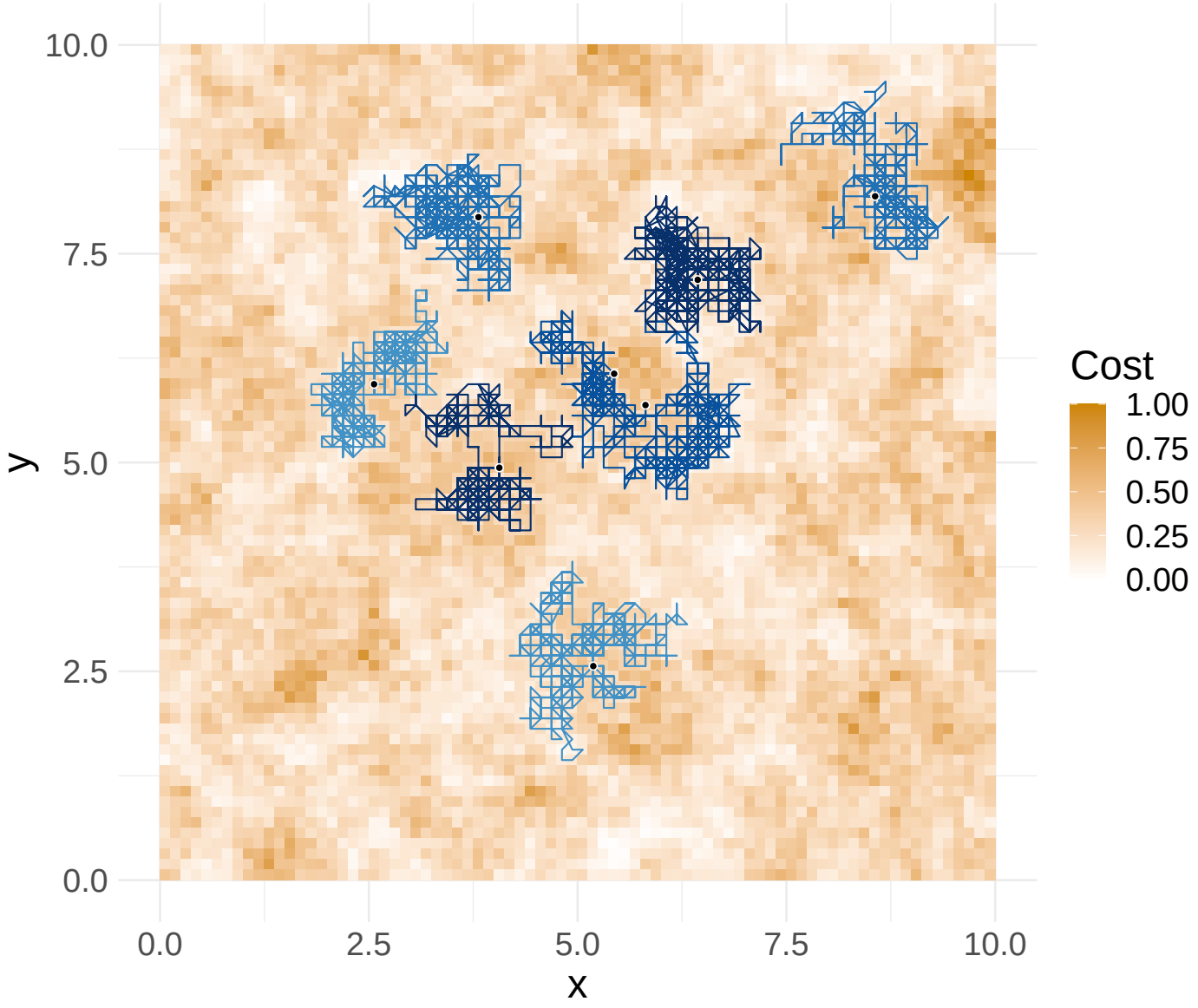
- Same as above

MOVEMENT DATA:

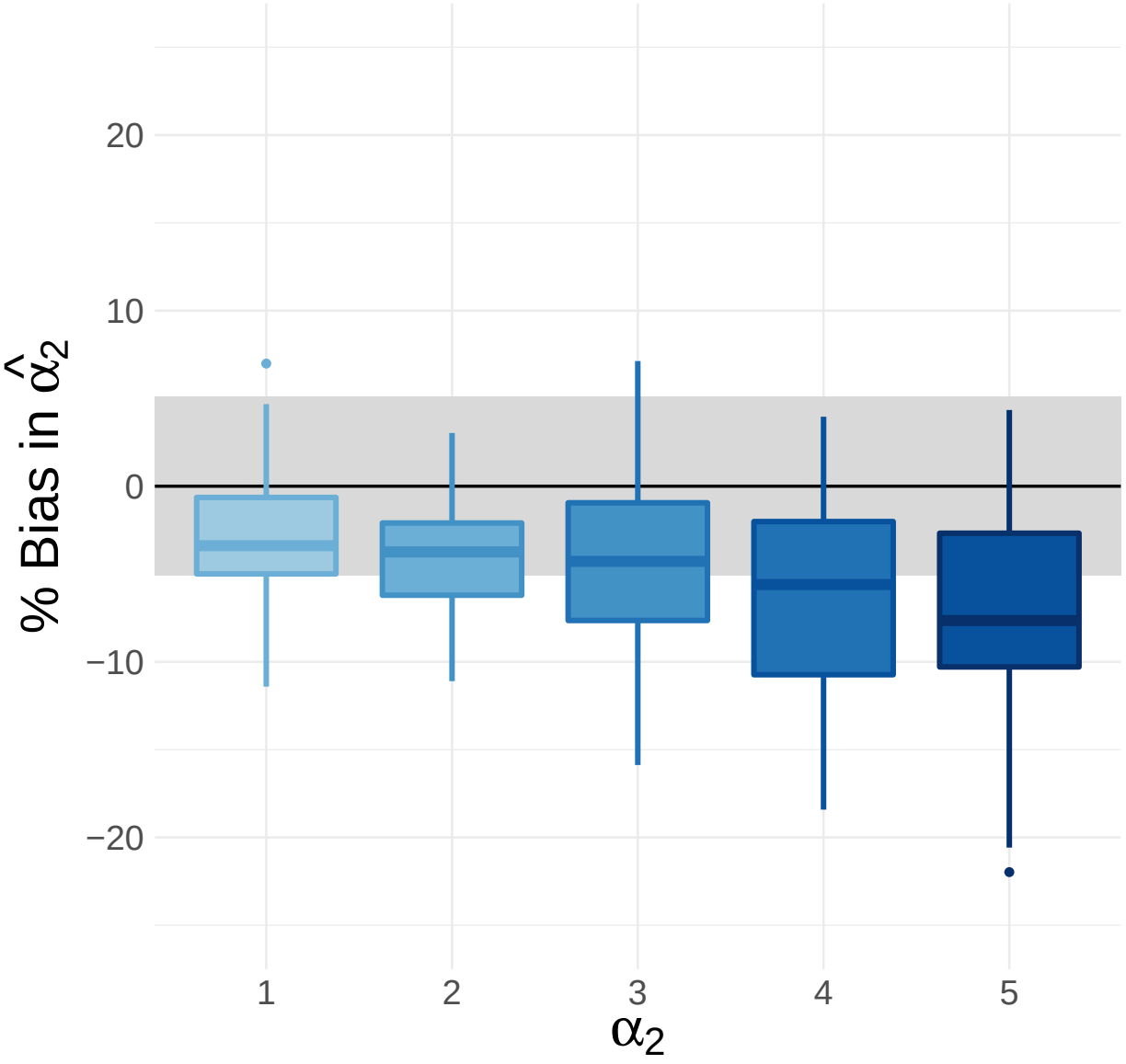
Parameter	Value	Description
upsilon	sigma/4	Space use - step length
psi	0.7	pr(Moved)
nfix	90*24	Number of pings
telemetry_n	8	Number of individuals tagged

50 simulations per cost value

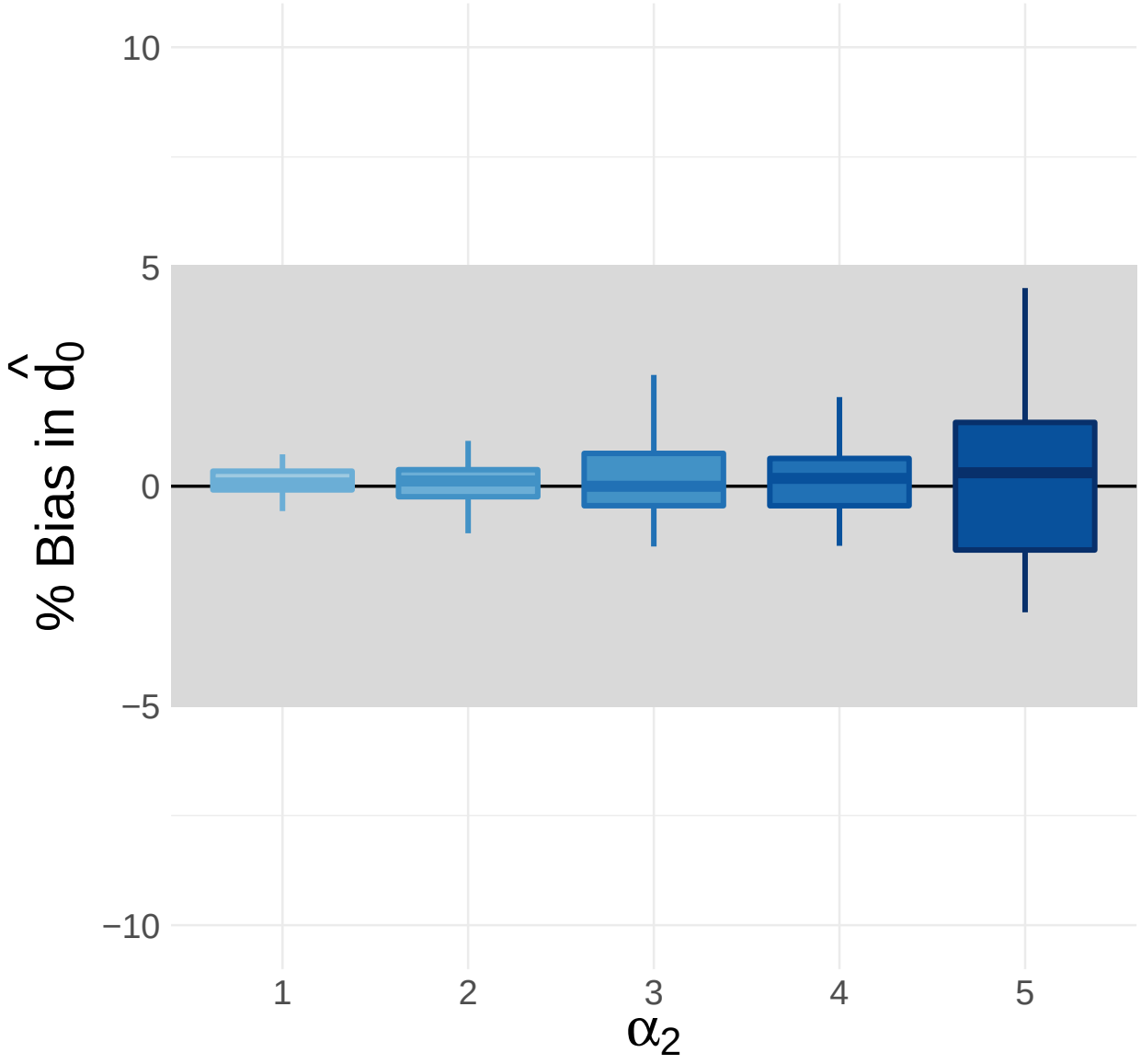
Simulating movement data



Cost estimation

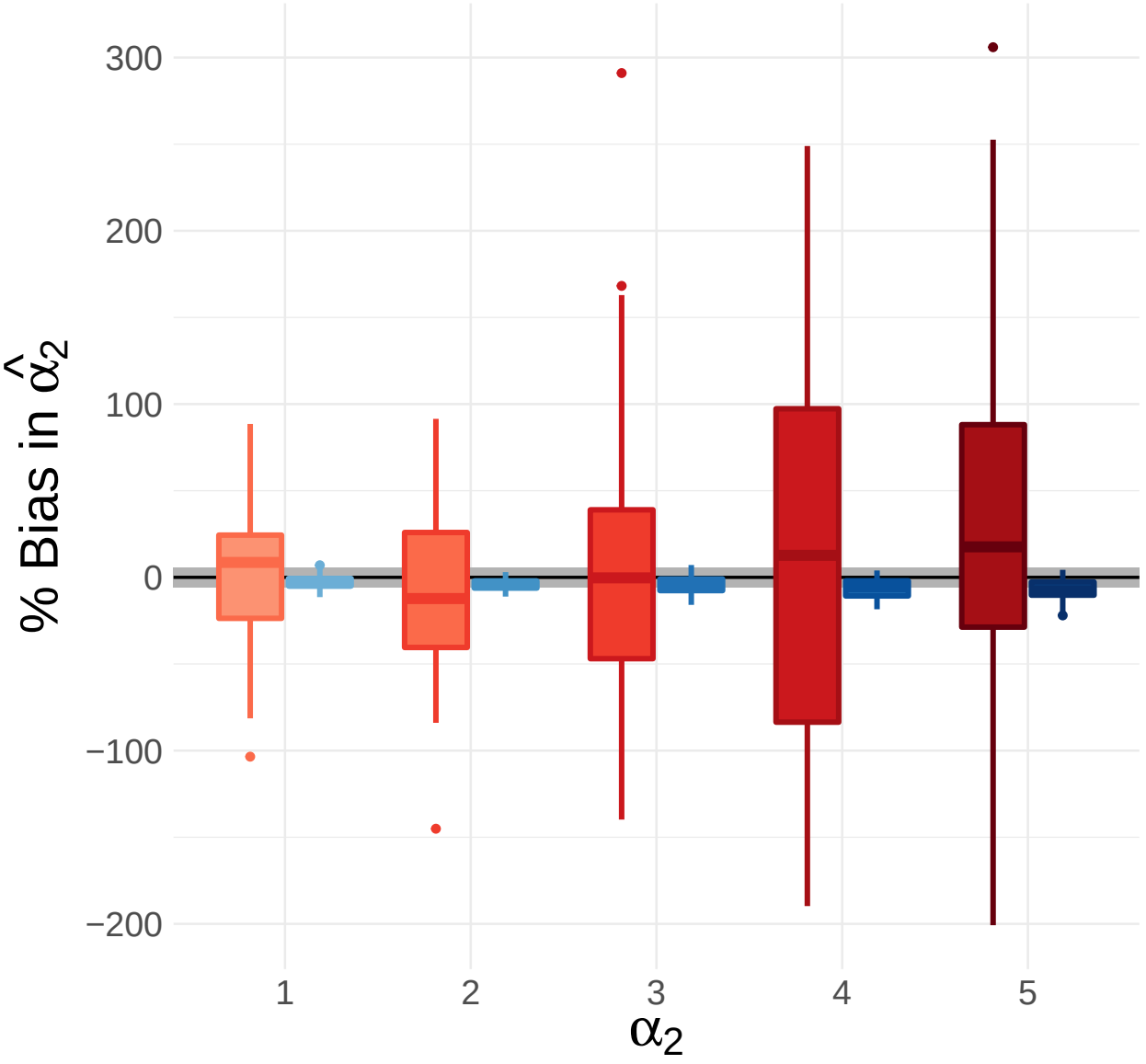
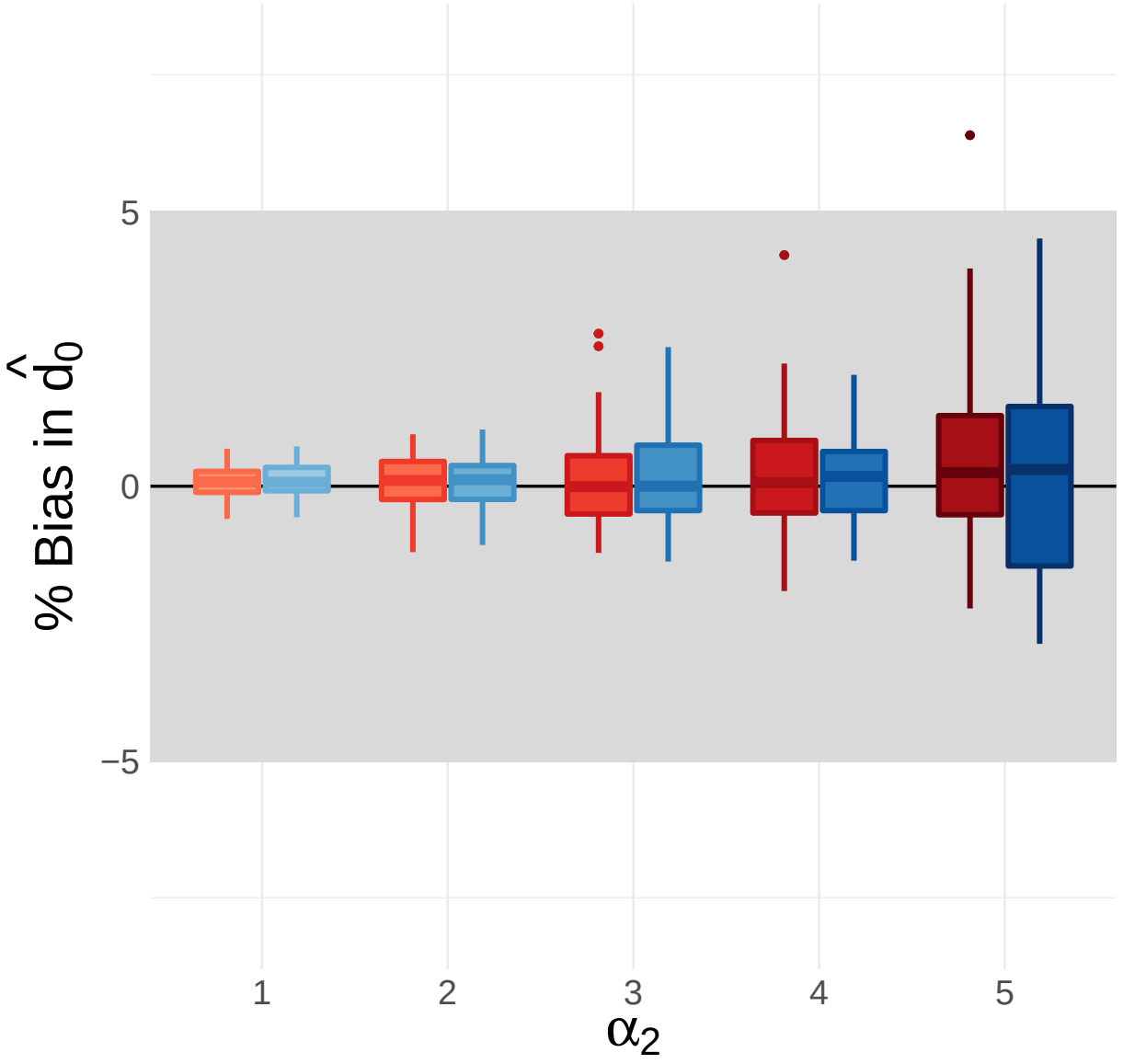


Density estimation



Comparisons

Compare cost



Compare density