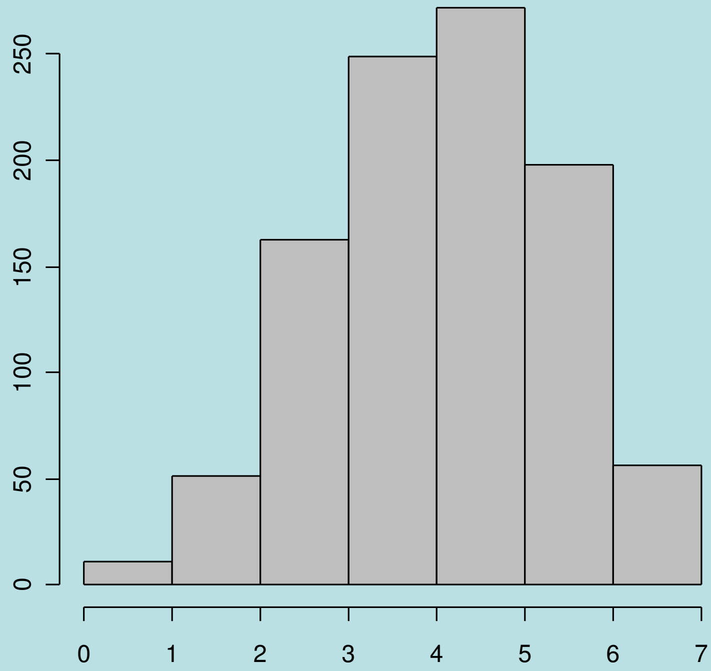
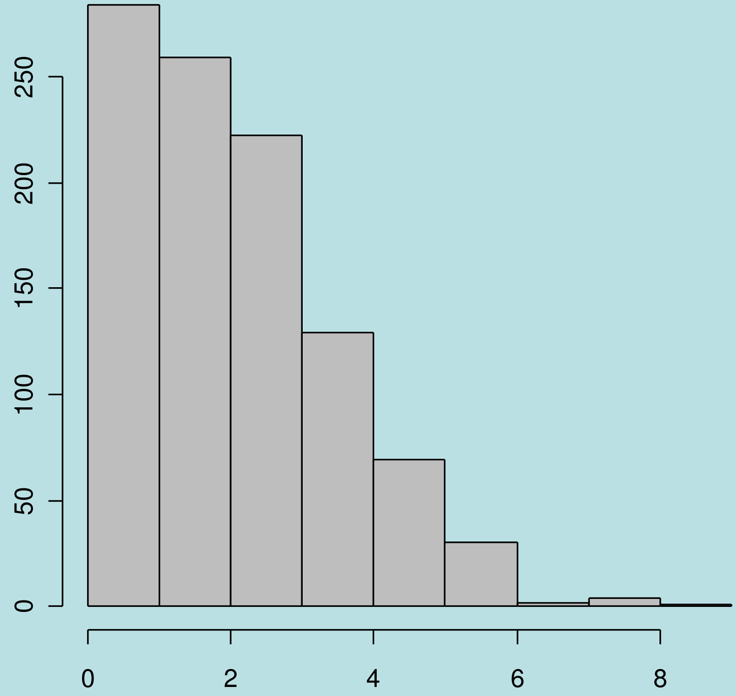
Rare Example: *Aphelandra sinclairiana*

7 individuals in year 0
5-year survival θ=0.71

1000 Random draws on 5-year survival:



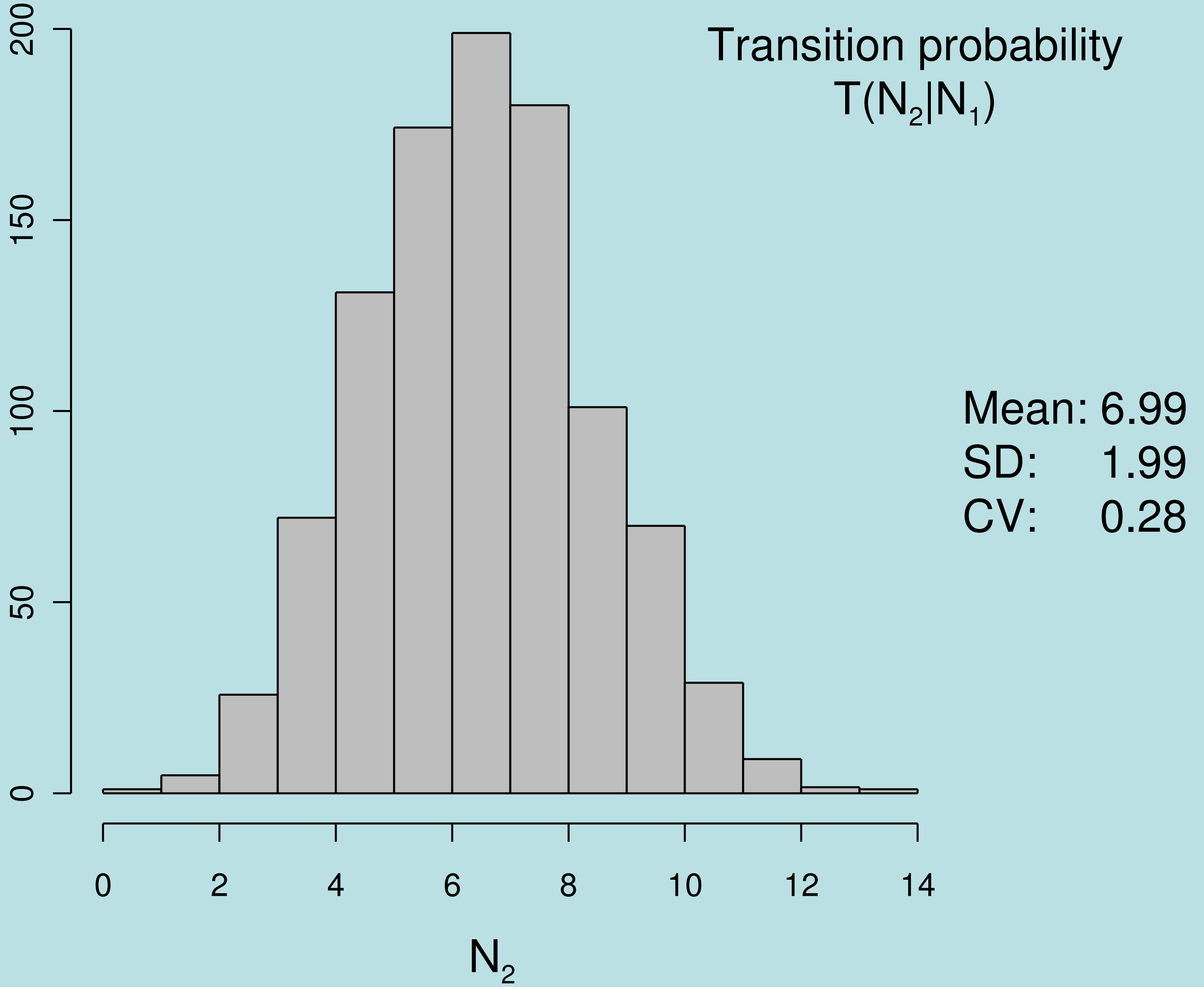
1000 Random draws on 5-year recruitment:



Rare Example: *Aphelandra sinclairiana* (cont)

N_1=7 individuals in year 0

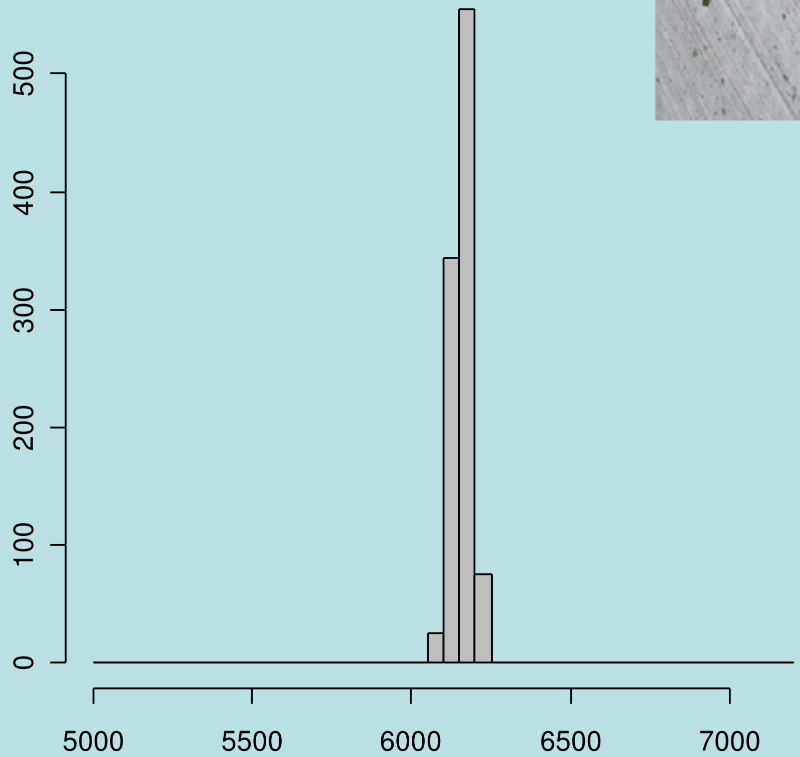
survival + recruitment produces:
1000 Random draws on 5-year population change:



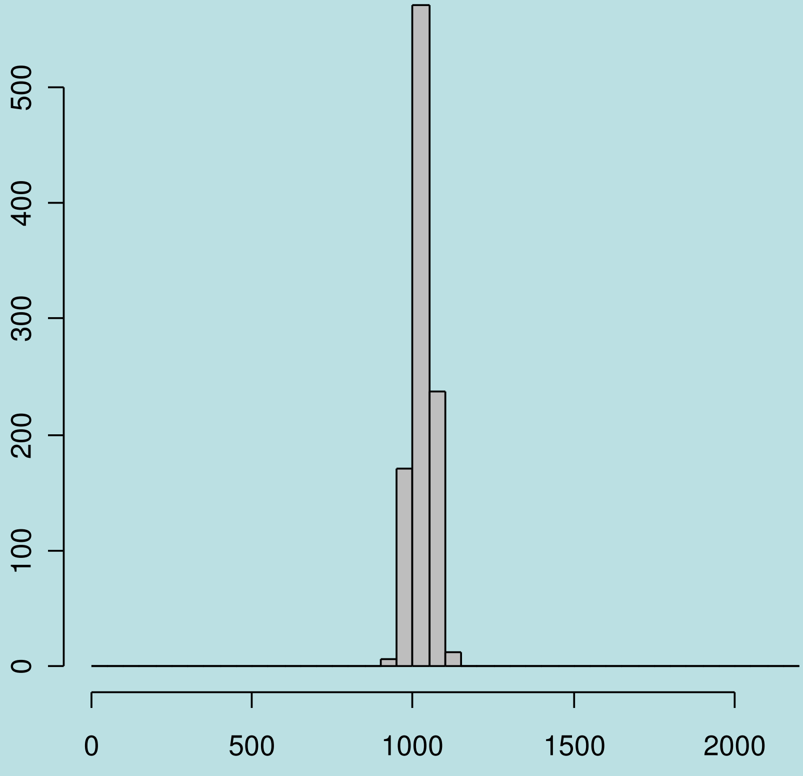
Abundant example: *Alseis blackiana*

7190 individuals in year 0
estimated survival θ=0.820

1000 Random draws on 5-year survival:



1000 Random draws on 5-year recruitment:

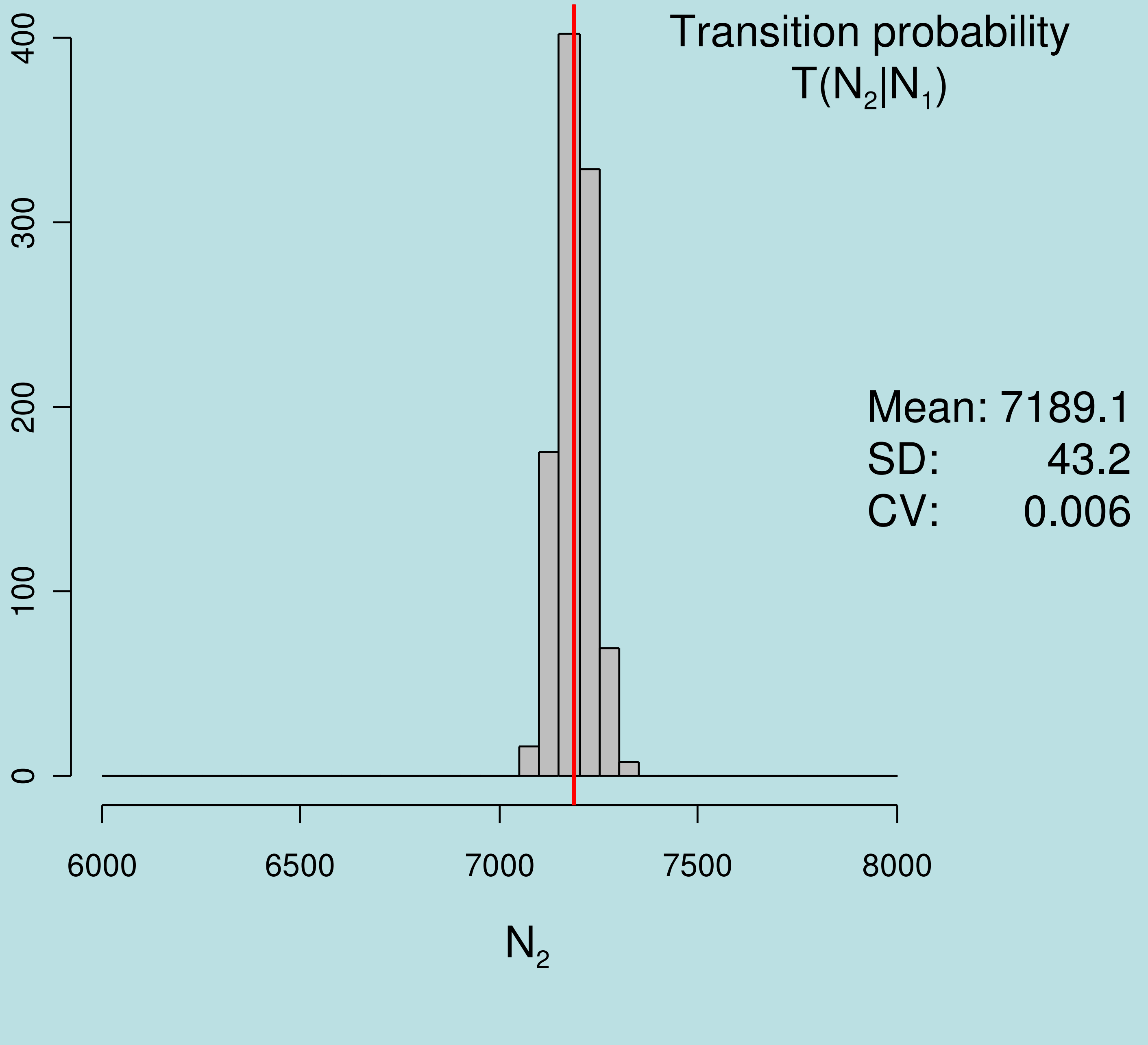


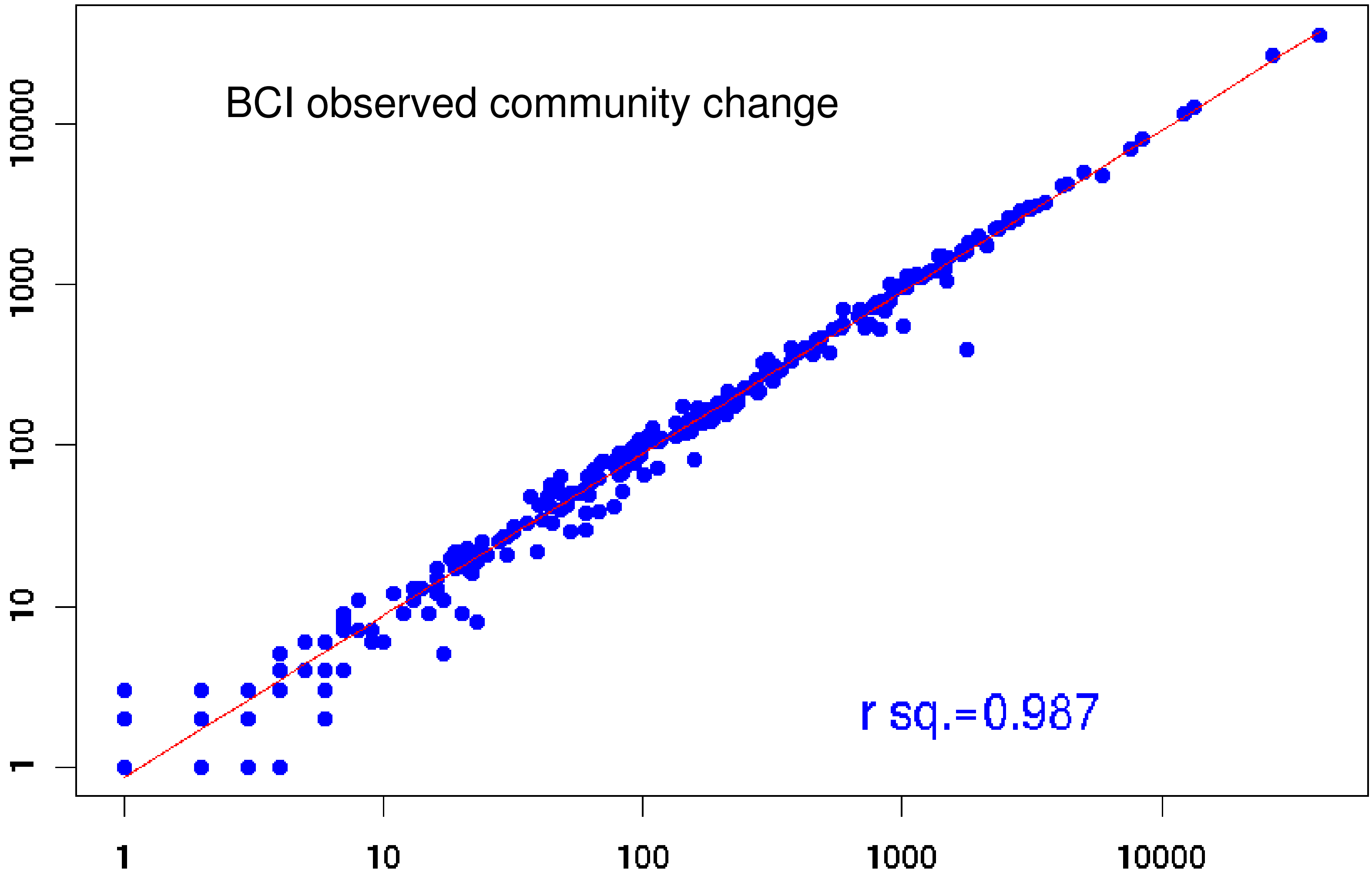
Abundant example: *Alseis blackiana*

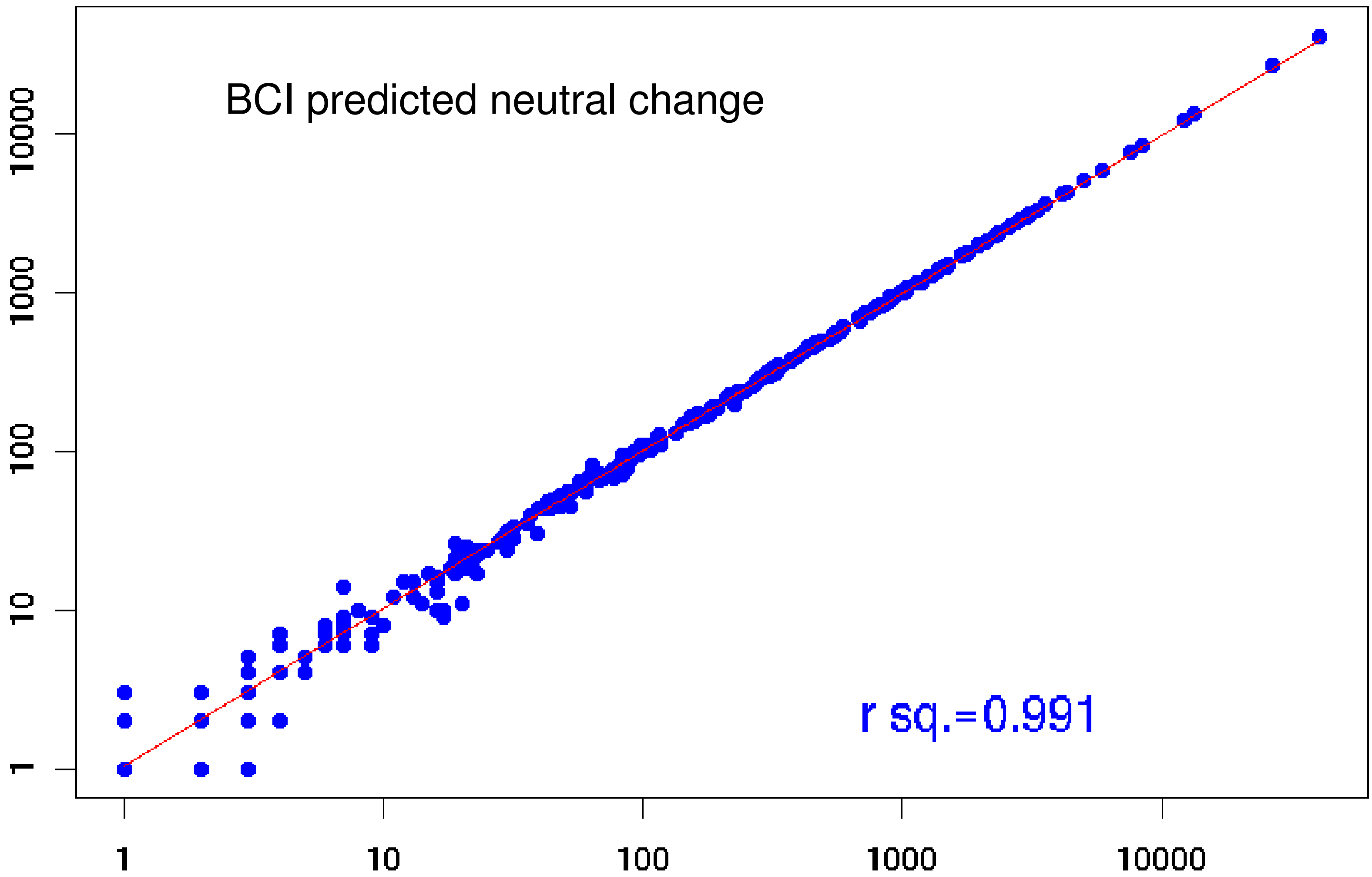
7190 individuals in year 0

survival + recruitment produces:

1000 Random draws on 5-year population change:



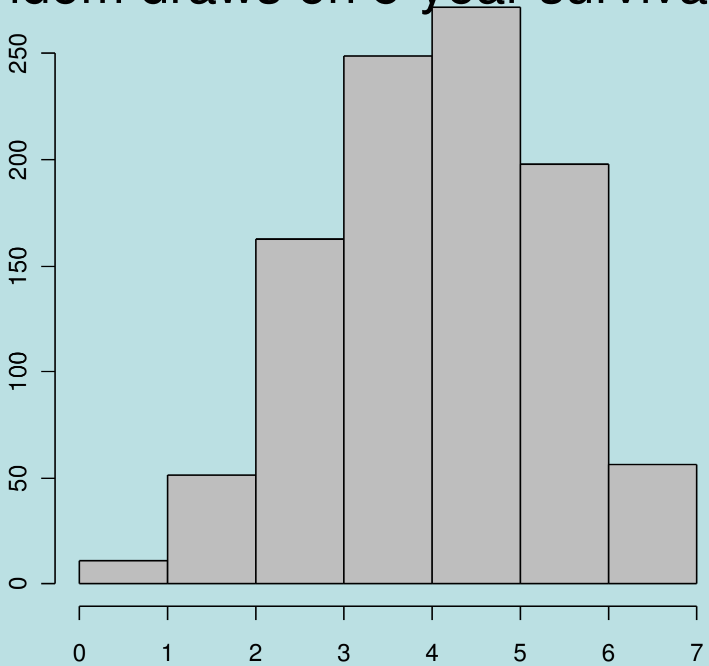

BCI observed community change
r sq.=0.987
10000
1000
100
10
1
1
10
100
1000
10000


BCI predicted neutral change
r sq.=0.991
10000
1000
100
10
1
1
10
100
1000
10000

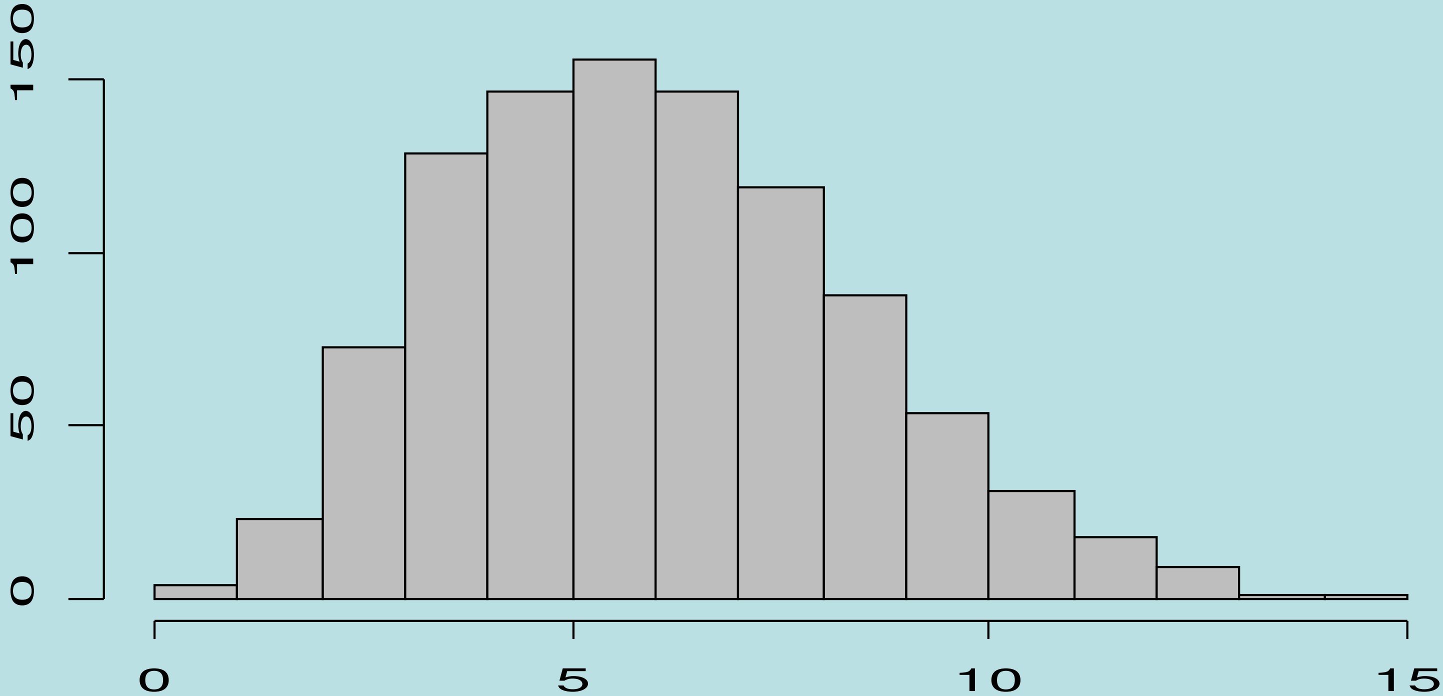
Rare example: *Aphelandra sinclairiana*
But now set λ=1.4

7 individuals in year 0, 10 in year 5

1000 Random draws on 5-year survival:



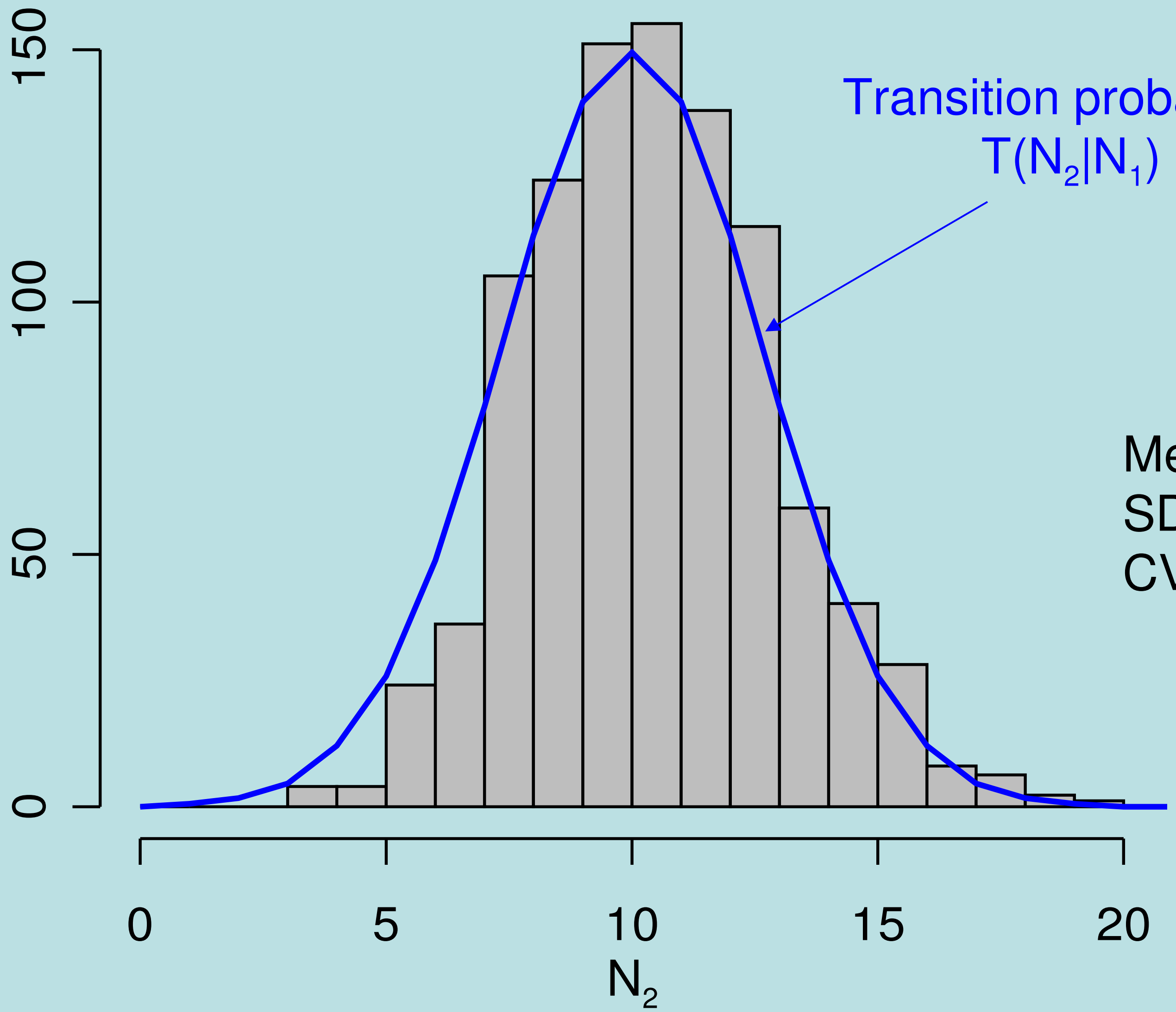
1000 Random draws on 5-year recruitment:



Rare Example: *Aphelandra sinclairiana* (cont)
with λ=1.4

N_1=7 individuals in year 0
estimated survival θ=0.71

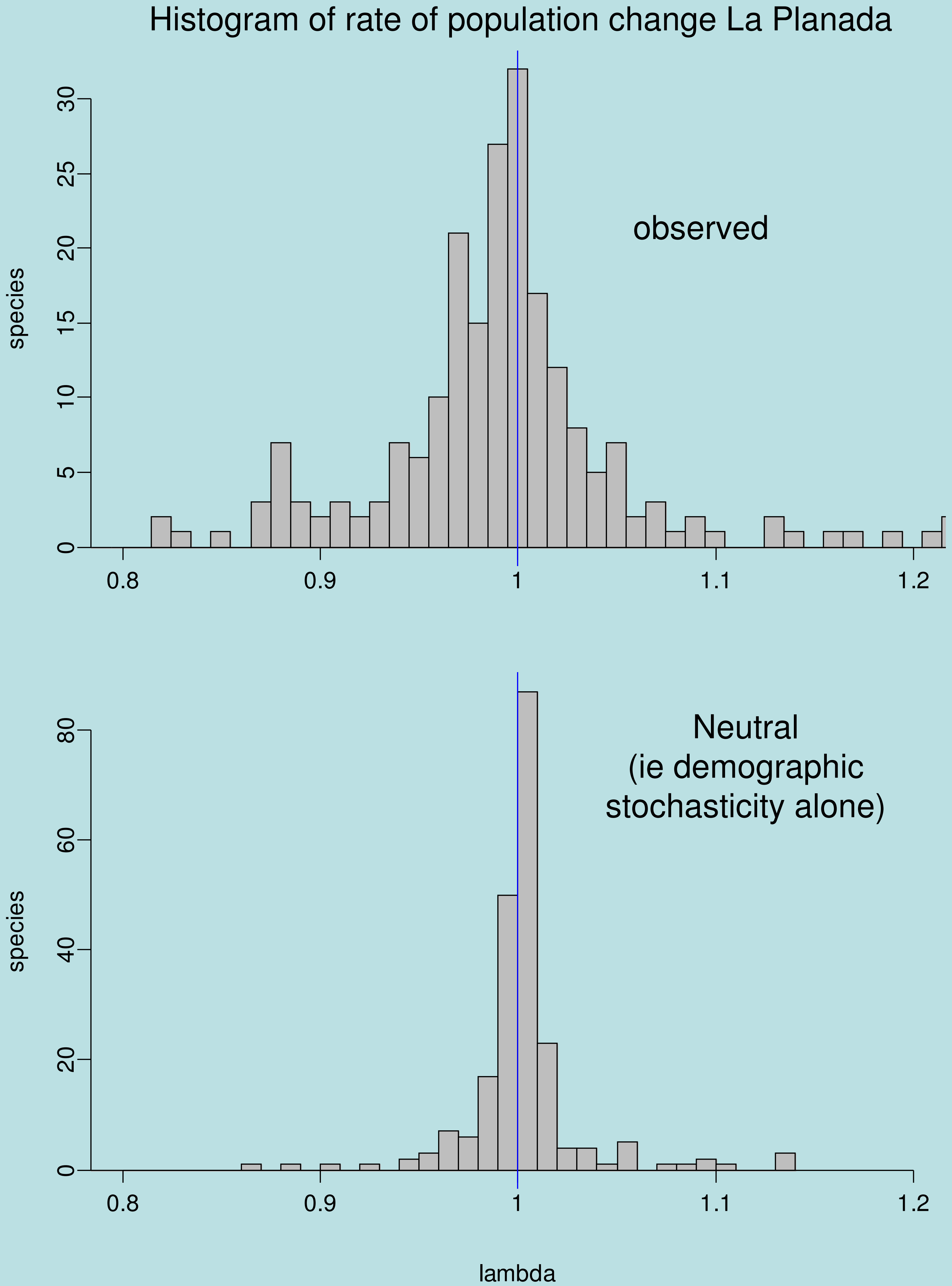
survival + recruitment produces:
1000 Random draws on 5-year population change:



The probability distribution of N_t is approx. normal,

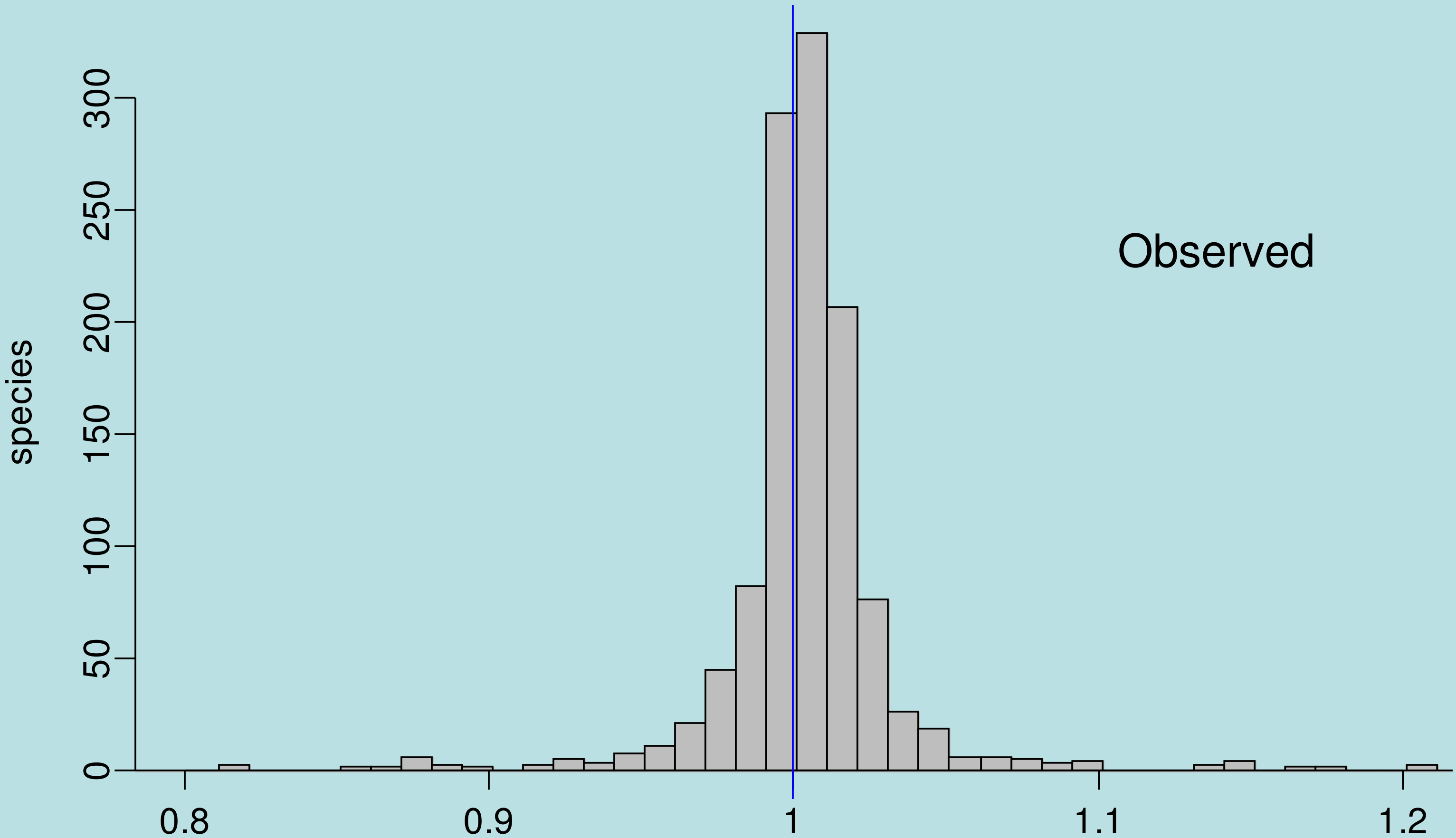
$$\text{mean} = N_0 \lambda$$

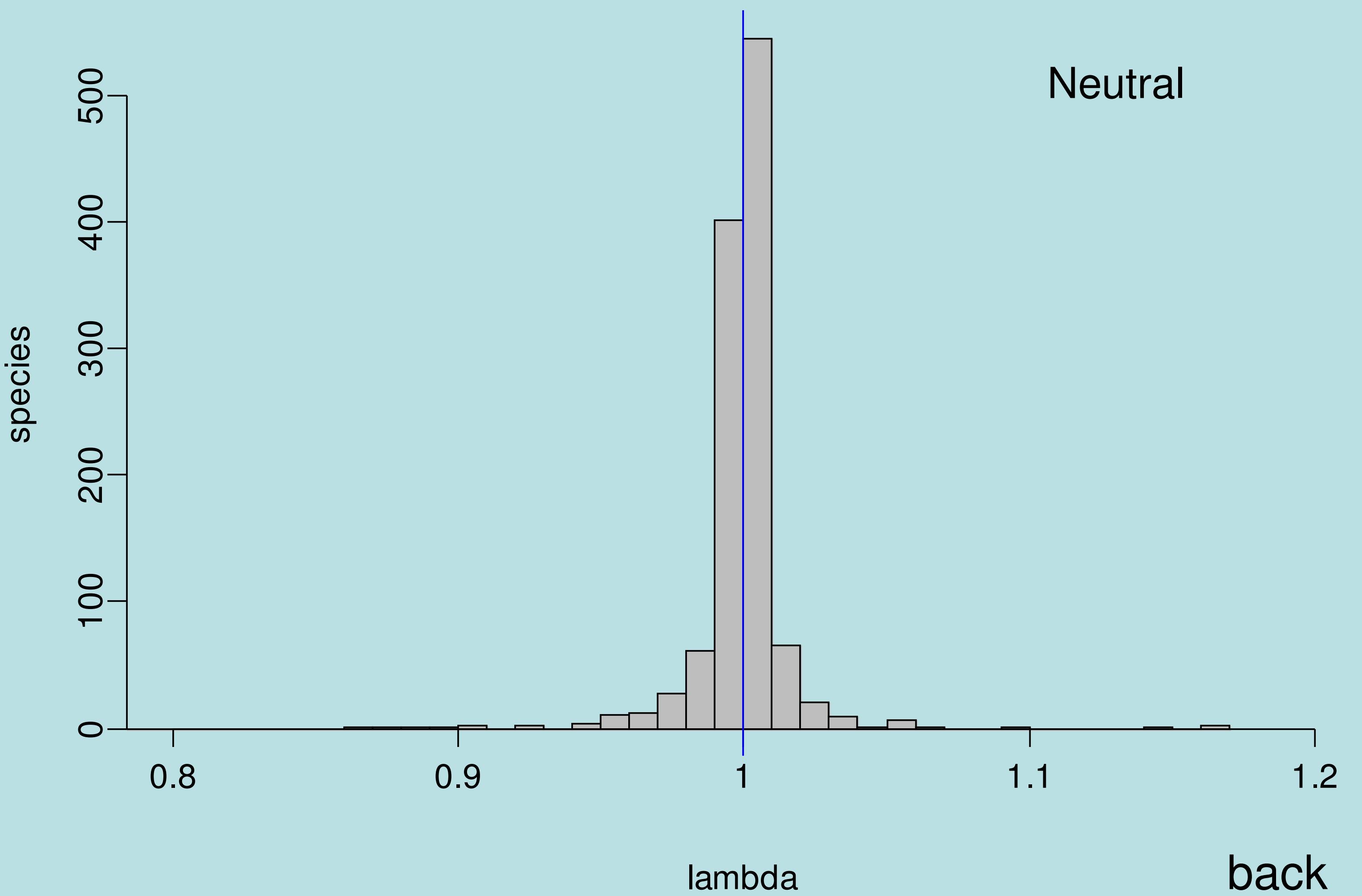
$$\text{var} = N_0(\lambda - \theta^2)$$



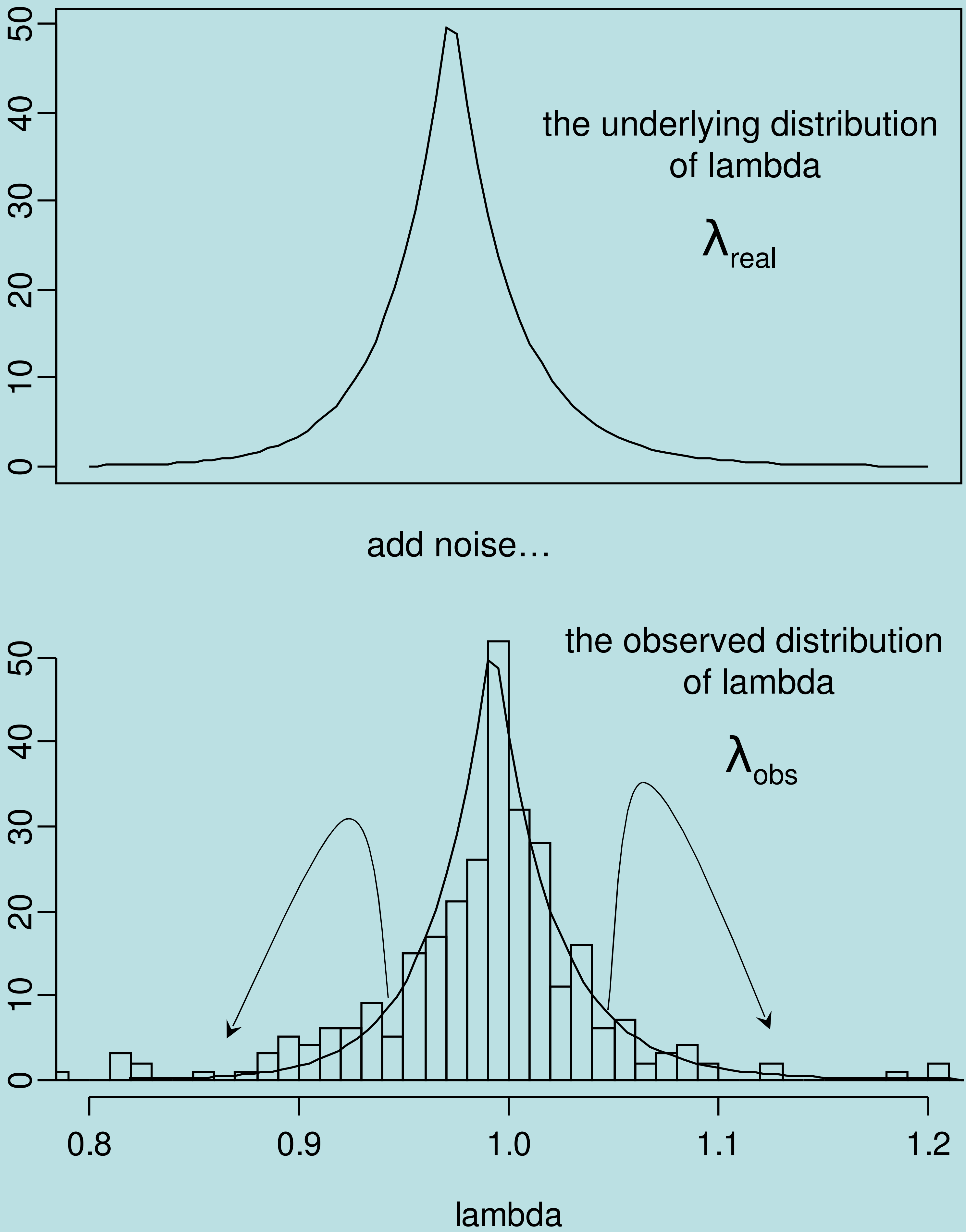
Histogram of rate of population change La Planada
observed
species
0
5
10
15
20
25
30
0.8
0.9
1
1.1
1.2
Neutral
(ie demographic
stochasticity alone)
species
0
20
40
60
80
0.8
0.9
1
1.1
1.2
lambda

Histogram of rate of population change Lambir





back



the underlying distribution of lambda
λreal
add noise…
the observed distribution of lambda
λobs
0
10
20
30
40
50
0.8
0.9
1.0
1.1
1.2
lambda

Substracting the noise

Simulate demographic stochasticity
(a neutral community):

-- Mortality rates vary across species

-- Recruitment=mortality

-- Mortality is binomial process

-- Recruitment is poisson process