R Notebook

Analysis of equilibrium resonse to power law scaling behaviors, single-consumer resource case.

```r
library(tidyverse)
```

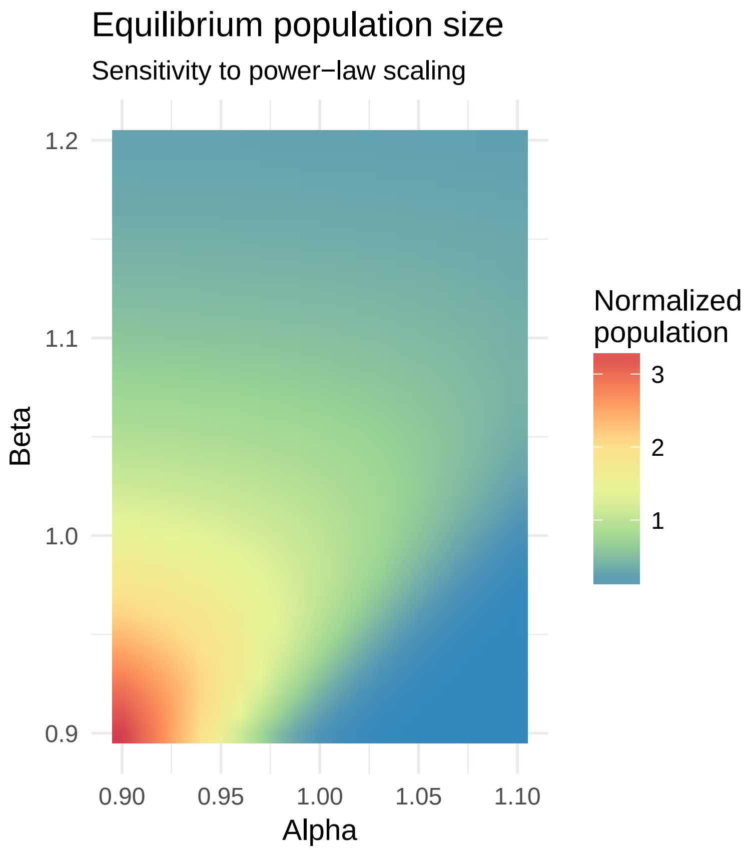
```r
n.dat <- read_csv('socio-eco-nw equilibrium-pop-table.csv', skip = 6) %>%
  select(alpha, beta, pop = 12)
```

```
## Parsed with column specification:
## cols(
##   `[run number]` = col_integer(),
##   r = col_double(),
##   `harvest-rate` = col_double(),
##   alpha = col_double(),
##   k = col_integer(),
##   `link-prob` = col_integer(),
##   beta = col_double(),
##   `conversion-efficiency` = col_double(),
##   `death-rate` = col_double(),
##   n = col_integer(),
##   `[step]` = col_integer(),
##   `[size] of social-system 0` = col_double()
## )
```

```r
x.dat <- read_csv('socio-eco-nw equilibrium-bio-table.csv', skip = 6) %>%
  select(alpha, beta, biomass = 12)
```

```
## Parsed with column specification:
## cols(
##   `[run number]` = col_integer(),
##   r = col_double(),
##   `harvest-rate` = col_double(),
##   alpha = col_double(),
##   k = col_integer(),
##   `link-prob` = col_integer(),
##   beta = col_double(),
##   `conversion-efficiency` = col_double(),
##   `death-rate` = col_double(),
##   n = col_integer(),
##   `[step]` = col_integer(),
##   `[size] of ecosystem 1` = col_double()
## )
```

```r
ggplot(n.dat, aes(alpha, beta, fill = pop / 60000)) +
  geom_raster(interpolate = T) +
  labs(title = 'Equilibrium population size', subtitle = 'Sensitivity to power-law scaling', x = 'Alpha
  scale_fill_distiller(name = 'Normalized \npopulation', palette = 'Spectral') +
  coord_equal() +
  theme_minimal()
```



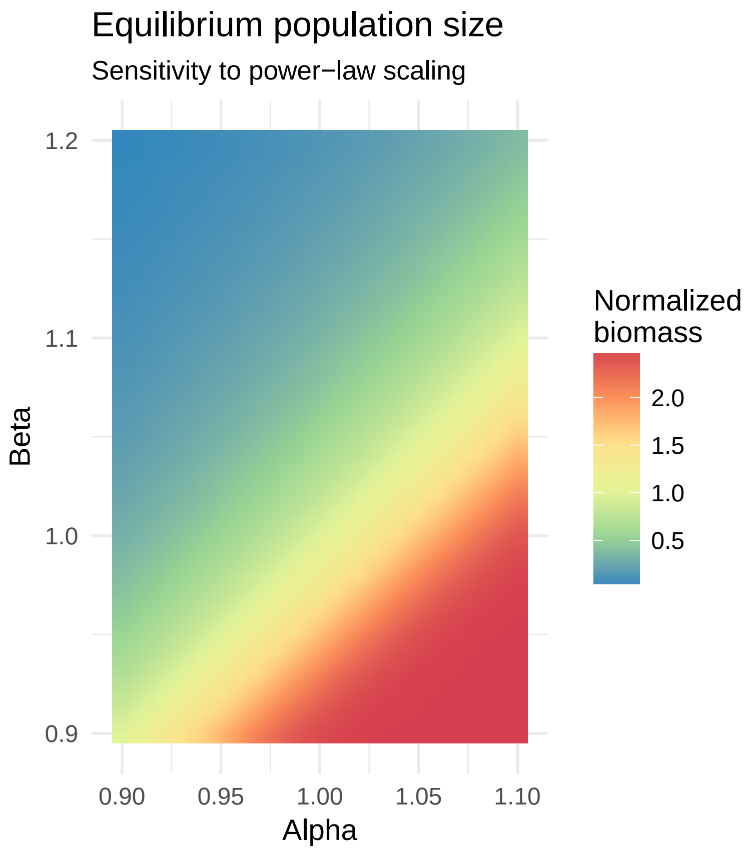

```
n.dat %>% filter(alpha == 1 & beta == 1)
```

```
## # A tibble: 1 × 3
##   alpha  beta   pop
##   <dbl> <dbl> <dbl>
## 1     1     1 60000
```

```
x.dat %>% filter(alpha == 1 & beta == 1)
```

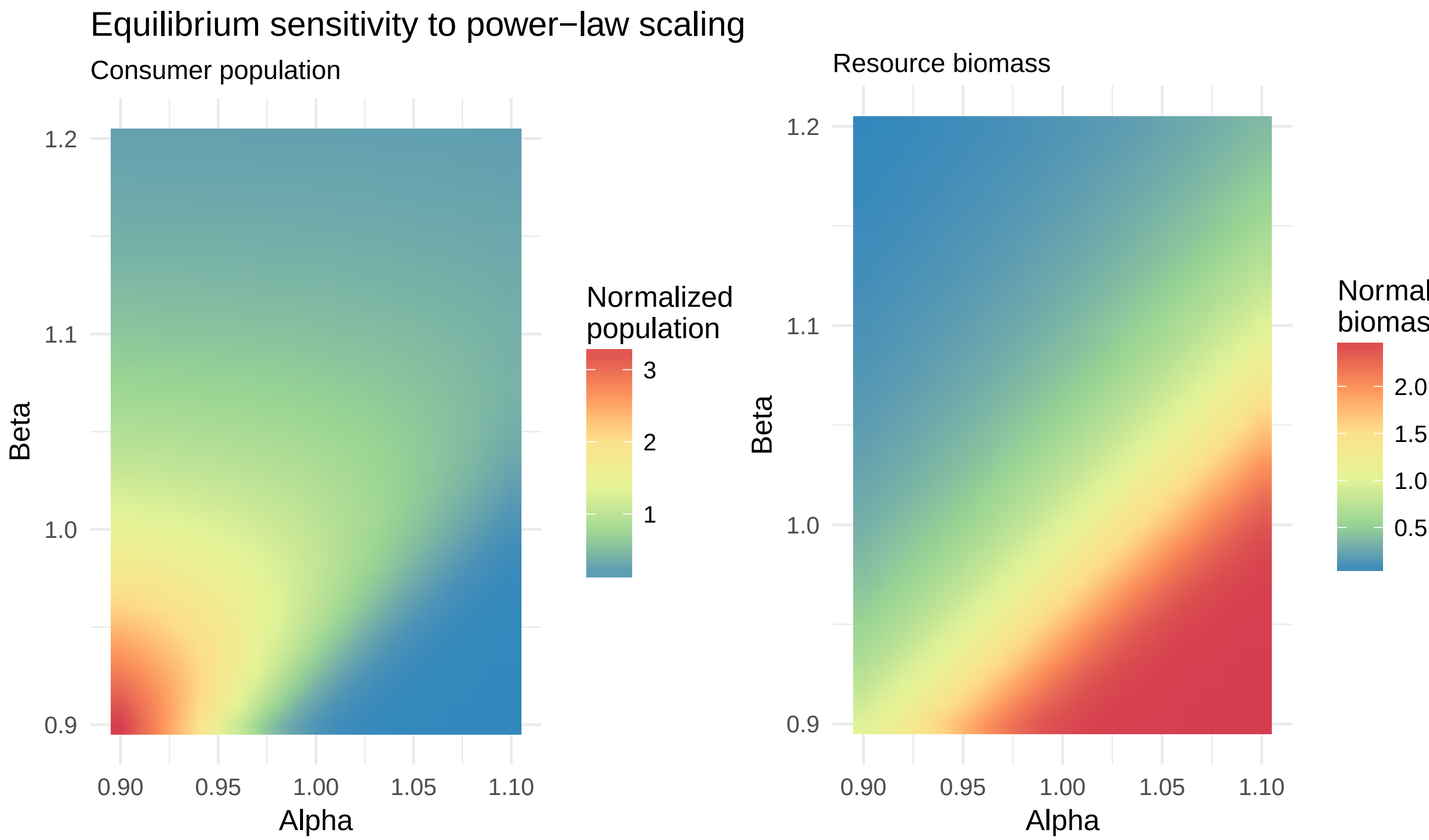
```
## # A tibble: 1 × 3
##   alpha  beta biomass
##   <dbl> <dbl>   <dbl>
## 1     1     1     0.4
```

```
ggplot(x.dat, aes(alpha, beta, fill = biomass/.4)) +
  geom_raster(interpolate = T) +
  labs(title = 'Equilibrium population size', subtitle = 'Sensitivity to power-law scaling', x = 'Alpha
  scale_fill_distiller(name = 'Normalized \nbiomass', palette = 'Spectral') +
  coord_equal() +
  theme_minimal()
```




```r
ggplot(n.dat, aes(alpha, beta, fill = pop / 60000)) +
  geom_raster(interpolate = T) +
  labs(title = 'Equilibrium sensitivity to power-law scaling', subtitle = 'Consumer population', x = 'Al
  scale_fill_distiller(name = 'Normalized \npopulation', palette = 'Spectral', position = 'bottom') +
  coord_equal() +
  theme_minimal()

ggplot(x.dat, aes(alpha, beta, fill = biomass/.4)) +
  geom_raster(interpolate = T) +
  labs(title = '', subtitle = 'Resource biomass', x = 'Alpha', y = 'Beta') +
  scale_fill_distiller(name = 'Normalized \nbiomass', palette = 'Spectral', position = 'bottom') +
  coord_equal() +
  theme_minimal()
```


Equilibrium sensitivity to power−law scaling
Consumer population
Resource biomass
Normalized population
3
2
1
Normal
biomas
2.0
1.5
1.0
0.5
Beta
Alpha
1.2
1.1
1.0
0.9
0.90
0.95
1.00
1.05
1.10