BIOI 410 Tutorial 6

Survival rates Classic metapopulation (Levin's)

Survival rates

- Radio-telemetry used to get accurate data on survival, movement and habitat use of cottontail rabbits.
- If survival rates are assumed to be constant over time, daily survival rates (\hat{s}_i) for a given interval (i) can be calculated as:

$$\widehat{s_i} = \frac{x_i - y_i}{x_i}$$

- x_i is the total number of transmitter days of exposure
- d_i is the number of mortality events

Survival rates

 Based on the following data (from Tent and Rongstad, 1974), calculate the daily survival rate, interval survival rate, and annual survival rate.

Interval	N days in interval	N rabbit days	Mortality #
Mar-April	61	617	3
May-Jun	61	820	3
Jul-Aug	62	1047	1
Sep-Oct	61	1660	6
Nov-Dec	61	1447	9
Jan-Feb	50	657	5

Metapopulation

- Eichhornia paniculata
- Aquatic plant



- Occupies seasonally arid north-east Brazil
- 226 possible habitat sites (patches)
- Based on the following data:
 - What is the expected number of occupied patches?
 - Is this met population expected to persist into the future?
 - If the colonization rate is expected to be reduced by 34%, what is the projected impact on the metapopulations?

Metapopulation

	patch		
year	occupancy	extinctions	colonizations
2000	53		
2001	54	1	2
2002	49	5	0
2003	47	4	2
2004	51	7	11
2005	46	6	1
2006	41	9	4
2007	46	1	6
2008	50	1	5
2009	52	0	2
2010	47	5	0
2011	50	2	5
2012	48	5	3
2013	52	1	5
2014	51	1	0
2015	56	8	13

$$\frac{dp}{dt} = cp(1-p) - ep$$

$$\hat{p} = 1 - \frac{e}{p}$$