

Announcements

Hooper office hours next week: T 11-12, W 1:30-2:30
 Review session: W 3-4, Biology Rm. 234; bring questions from lecture, study guides (Hooper will have no prepared presentation).
 Final: Th 10:30-12:30, here (SL 150)
 Extra Credit due: to Merrill or in Hooper's box in Biology office by Mon. 4:30 p.m.

Additional Questions

25. Structuring the course by themes (global warming, biodiversity, pop'n growth) was 1- not useful....5-useful. Please comment on purple form too (#4)
26. Reading organization was 5-fine 1-difficult. That is, how annoying was it to jump around in the book? Please comment on purple form, if necessary (#5)
27. I would strongly prefer (5)...strongly not prefer (1) to go through the book in order (physiological → pop'n → comm → ecosystem ecology).
28. Revisiting themes linked to previous topics was 5- very helpful....1 - not helpful.

Population Ecology 4 - Life Tables

- (Chap. 10)
- A. Patterns of survival and reproduction
 - B. Age distributions
 - C. Calculating rates of population change
 - a. non-overlapping generations
 - b. overlapping generations

A. Patterns of survival and reproduction

What do we need to know about pop'n to figure out b and d so we can figure out r?

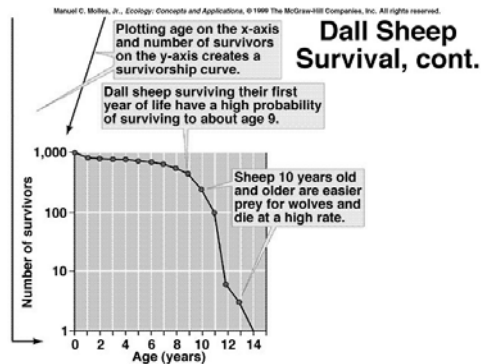
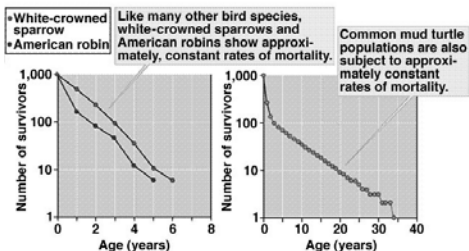
Are birth and death rates similar for all individuals in a population?

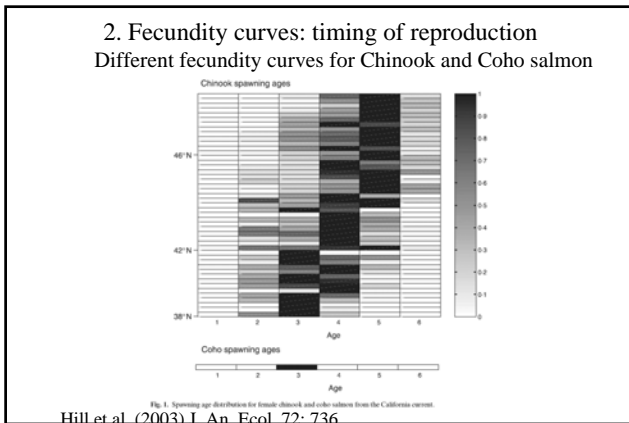
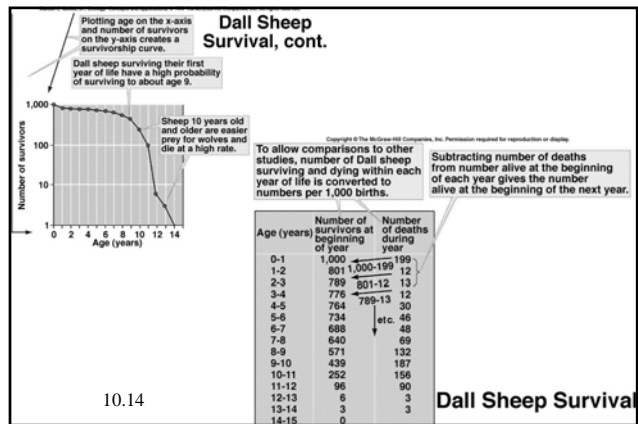
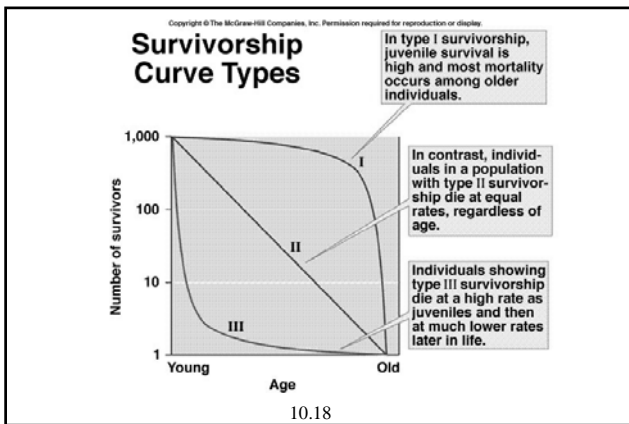
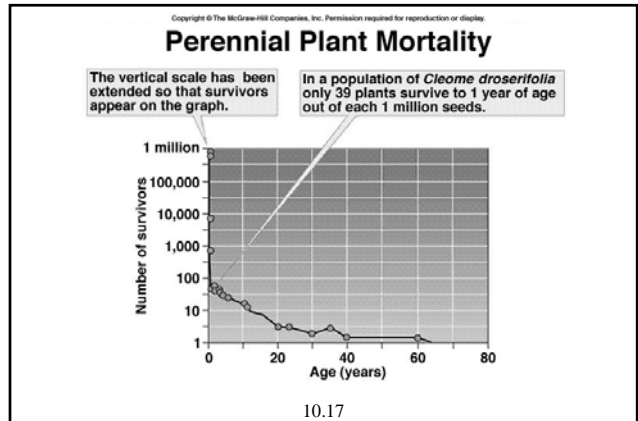
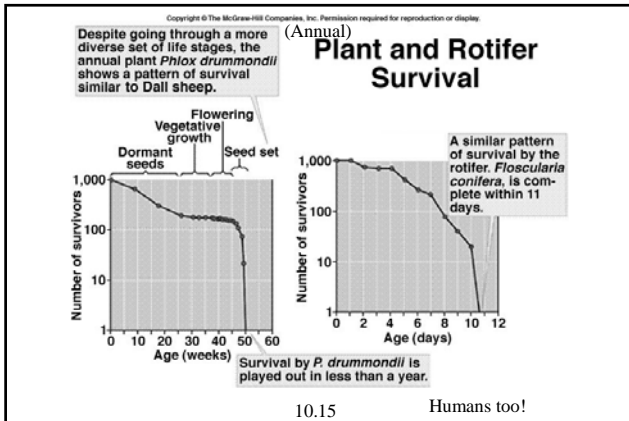
How do b and d vary with age?

1. Survivorship curves show how likelihood of death varies with age

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Constant Rates of Survival





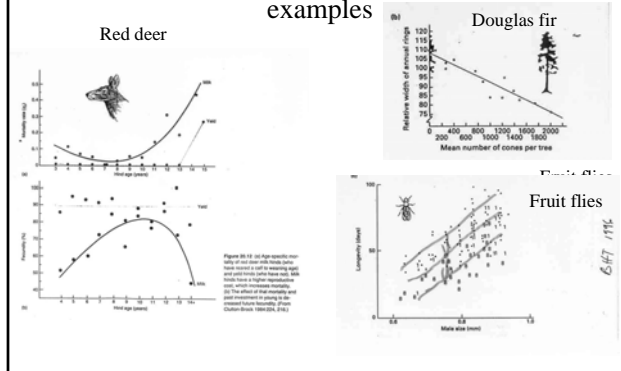
Fecundity for humans and oak trees

3. Relationship to life history traits

Reproductive allocation vs. growth/survival

- limited resources
- reproduction is energetically expensive
- different reproductive strategies
 - a. frequent disturbances
 - b. stable environments

a. Reproduction vs. growth tradeoffs: examples



b. r- vs K-selection

r-selection K-selection

A. Disturbance	Common, irregular	Rarer, more regular
B. Mortality	Variable, unpredictable	Constant, predictable
C. Competition	Low or variable	High, constant
D. Pop. size	Variable, below K	Rel. constant, near K
E. Consequence	High r	Good competitors



- Small size
- Rapid growth
- Early reproduction
- Many, small offspring
- Little parental care



- Large size
- Slow growth
- Late reproduction
- Few, large offspring
- More parental care

FIGURE 12.19 Mouse and elephant: r selection versus K selection.

K vs. r selection: extremes in parental care



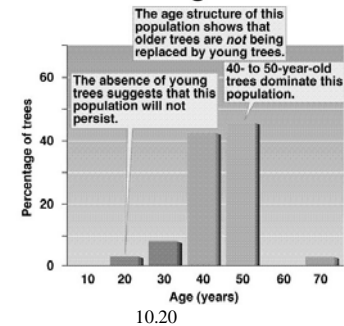
Sea urchins

Humpback whales



B. Age distributions help tell if population is growing or shrinking.

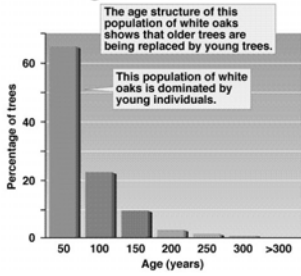
Cottonwood Age Distribution



Is this population growing or shrinking?

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Age Distribution



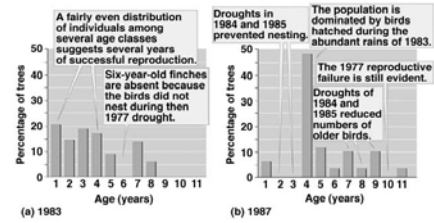
10.19

Can't tell for sure: depends if age distribution is stable or not

Are age distributions typically stable?

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Finch Age Distribution



10.21 – Age distributions of large cactus finch, *Geospiza conirostris*, on Genovesa Is., Galapagos

C. Calculating rates of population change

1. Non-overlapping generations

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Geometric Rate of Increase

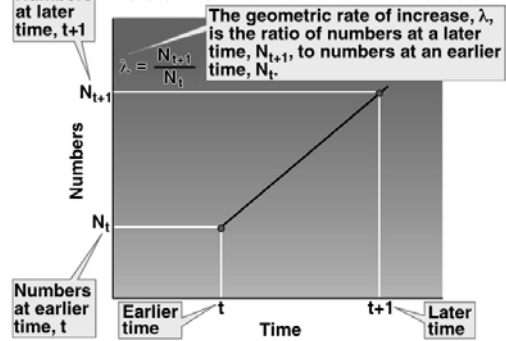


Table 10.1
Combining survivorship with seed production by *P. drummondii* to estimate net reproductive rate, R_0

Age (days)	Number surviving to day x	Proportion surviving to day x	Average number of seeds per individual during time interval	Multiplication of l_x and m_x
x	n_x	l_x	m_x	$l_x m_x$
0-299	996	1.0000	0.0000	0.0000
299-306	158	0.1586	0.3394	0.0532
306-13	154	0.1546	0.7963	0.1231
313-20	151	0.1516	2.3995	0.3638
320-27	147	0.1476	3.1904	0.4589
327-34	136	0.1365	2.5411	0.3470
334-41	105	0.1054	3.1589	0.3330
341-48	74	0.0743	8.6625	0.6436
348-55	22	0.0221	4.3072	0.0951
355-62	0	0.0000	0.0000	0.0000

Data from Levitch and Levin 1979.

$$R_0 = \sum l_x m_x = 2.4177$$

The value of R_0 , which is greater than 1.0, indicates that this population of *P. drummondii* is growing.

Summing the final column yields R_0 , the net reproductive rate per individual.

Each individual leaves an average of 2.4177 offspring.

2. Overlapping generations: life tables

(use board)

Table 10.2

Calculating net reproductive rate, R_0 , and generation time, T , for a population of the common reed, *Phragmites*.

Age (years)	l_x	m_x	$l_x m_x$	$x l_x m_x$
1	0.9999	0.0	0.0	0.0
2	0.9999	0.0	0.0	0.0
3	0.9999	0.0	0.0	0.0
4	0.9999	0.0	0.0	0.0
5	0.9999	0.0	0.0	0.0
6	0.9999	0.0	0.0	0.0
7	0.9999	0.0	0.0	0.0
8	0.9999	0.0	0.0	0.0
9	0.9999	0.0	0.0	0.0
10	0.9999	0.0	0.0	0.0
11	0.9999	0.0	0.0	0.0
12	0.9999	0.0	0.0	0.0
13	0.9999	0.0	0.0	0.0
14	0.9999	0.0	0.0	0.0
15	0.9999	0.0	0.0	0.0
16	0.9999	0.0	0.0	0.0
17	0.9999	0.0	0.0	0.0
18	0.9999	0.0	0.0	0.0
19	0.9999	0.0	0.0	0.0
20	0.9999	0.0	0.0	0.0
21	0.9999	0.0	0.0	0.0
22	0.9999	0.0	0.0	0.0
23	0.9999	0.0	0.0	0.0
24	0.9999	0.0	0.0	0.0
25	0.9999	0.0	0.0	0.0
26	0.9999	0.0	0.0	0.0
27	0.9999	0.0	0.0	0.0
28	0.9999	0.0	0.0	0.0
29	0.9999	0.0	0.0	0.0
30	0.9999	0.0	0.0	0.0
31	0.9999	0.0	0.0	0.0
32	0.9999	0.0	0.0	0.0
33	0.9999	0.0	0.0	0.0
34	0.9999	0.0	0.0	0.0
35	0.9999	0.0	0.0	0.0
36	0.9999	0.0	0.0	0.0
37	0.9999	0.0	0.0	0.0
38	0.9999	0.0	0.0	0.0
39	0.9999	0.0	0.0	0.0
40	0.9999	0.0	0.0	0.0
41	0.9999	0.0	0.0	0.0
42	0.9999	0.0	0.0	0.0
43	0.9999	0.0	0.0	0.0
44	0.9999	0.0	0.0	0.0
45	0.9999	0.0	0.0	0.0
46	0.9999	0.0	0.0	0.0
47	0.9999	0.0	0.0	0.0
48	0.9999	0.0	0.0	0.0
49	0.9999	0.0	0.0	0.0
50	0.9999	0.0	0.0	0.0
51	0.9999	0.0	0.0	0.0
52	0.9999	0.0	0.0	0.0
53	0.9999	0.0	0.0	0.0
54	0.9999	0.0	0.0	0.0
55	0.9999	0.0	0.0	0.0
56	0.9999	0.0	0.0	0.0
57	0.9999	0.0	0.0	0.0
58	0.9999	0.0	0.0	0.0
59	0.9999	0.0	0.0	0.0
60	0.9999	0.0	0.0	0.0
61	0.9999	0.0	0.0	0.0
62	0.9999	0.0	0.0	0.0
63	0.9999	0.0	0.0	0.0
64	0.9999	0.0	0.0	0.0
65	0.9999	0.0	0.0	0.0
66	0.9999	0.0	0.0	0.0
67	0.9999	0.0	0.0	0.0
68	0.9999	0.0	0.0	0.0
69	0.9999	0.0	0.0	0.0
70	0.9999	0.0	0.0	0.0
71	0.9999	0.0	0.0	0.0
72	0.9999	0.0	0.0	0.0
73	0.9999	0.0	0.0	0.0
74	0.9999	0.0	0.0	0.0
75	0.9999	0.0	0.0	0.0
76	0.9999	0.0	0.0	0.0
77	0.9999	0.0	0.0	0.0
78	0.9999	0.0	0.0	0.0
79	0.9999	0.0	0.0	0.0
80	0.9999	0.0	0.0	0.0
81	0.9999	0.0	0.0	0.0
82	0.9999	0.0	0.0	0.0
83	0.9999	0.0	0.0	0.0
84	0.9999	0.0	0.0	0.0
85	0.9999	0.0	0.0	0.0
86	0.9999	0.0	0.0	0.0
87	0.9999	0.0	0.0	0.0
88	0.9999	0.0	0.0	0.0
89	0.9999	0.0	0.0	0.0
90	0.9999	0.0	0.0	0.0
91	0.9999	0.0	0.0	0.0
92	0.9999	0.0	0.0	0.0
93	0.9999	0.0	0.0	0.0
94	0.9999	0.0	0.0	0.0
95	0.9999	0.0	0.0	0.0
96	0.9999	0.0	0.0	0.0
97	0.9999	0.0	0.0	0.0
98	0.9999	0.0	0.0	0.0
99	0.9999	0.0	0.0	0.0
100	0.9999	0.0	0.0	0.0

The value of R_0 is 1.0000, which indicates that this population of *Phragmites* is stable.

The generation time is 1.0000 years.