

# parasite-driven host population cycles.



acute,  
immunizing  
pathogen.  
with vital dynamics

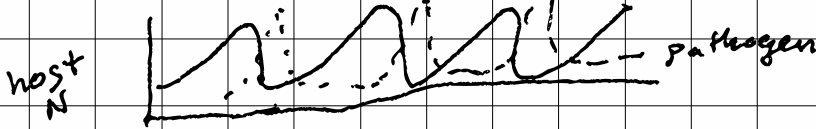
for humans:  
we don't usually think  
of the overall population size  
changing

$$\underline{S + I + R = N}$$

total  
population

WILDLIFE populations:

\* LOTKA-VOLTERRA pred-prey equation  
\* population cycles



Seals and phocine distemper virus

[ MORBILLIVIRUSES: measles, rinderpest, ] [ canine distemper virus (CDV) ]

phocine = seals

die-offs 1758, 1813, 1836, 1869-70, 1930s... ↗

reumatode  
Red grouse. (Trichostrongylus tenuis)  
herbivorous - heather.  
northern regions,  
nutrient poor, low quality.

Scotland, northern England.

MANAGED populations

hunted ~ game books (records)  
since the mid-19<sup>th</sup> c.

lynx-  
hare

6-7 year cycles.

eggs → free living larvae → grouse intestines.

high worm burdens lower fecundity

EXPERIMENT. locate most of the grouse  
on a moor.

give them antihelminthic drugs  
(ivermectin)

6 moors, 3 control, 3 treatment

classic experiment to prove that

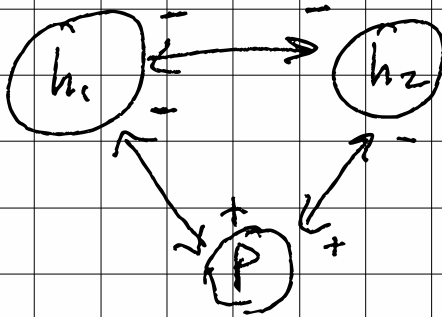
A → B

shut off A, show that B stops  
happening.

# parasites + host communities

- move from parasite-host systems to more complicated communities.

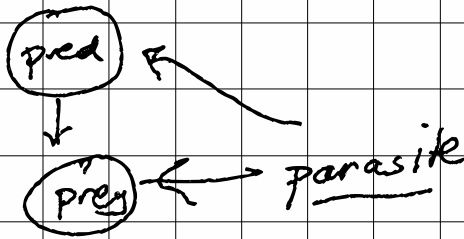
host comm.



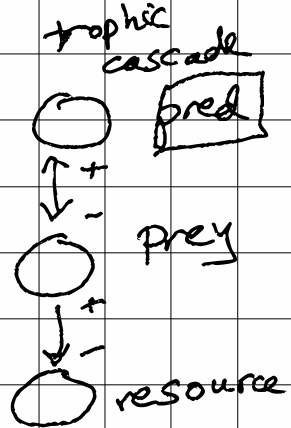
pred ←  
prey ←

- coexistence of hosts (invasion of hosts)

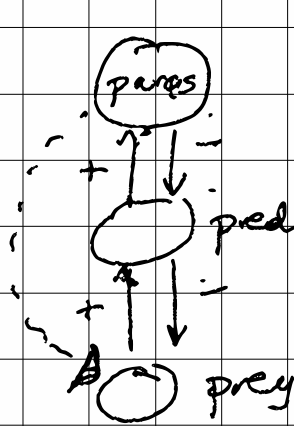
change energy flows?



trophic cascades ~~~~~



# DIRECT and INDIRECT interactions.



effects on  
fitness / effects on  
growth rate /

↓  
effects on pop  
size.

density-mediated  
and trait-mediated  
interactions

↙  
behavioural changes  
phenotypic plasticity