Impacts of disease on wildlife

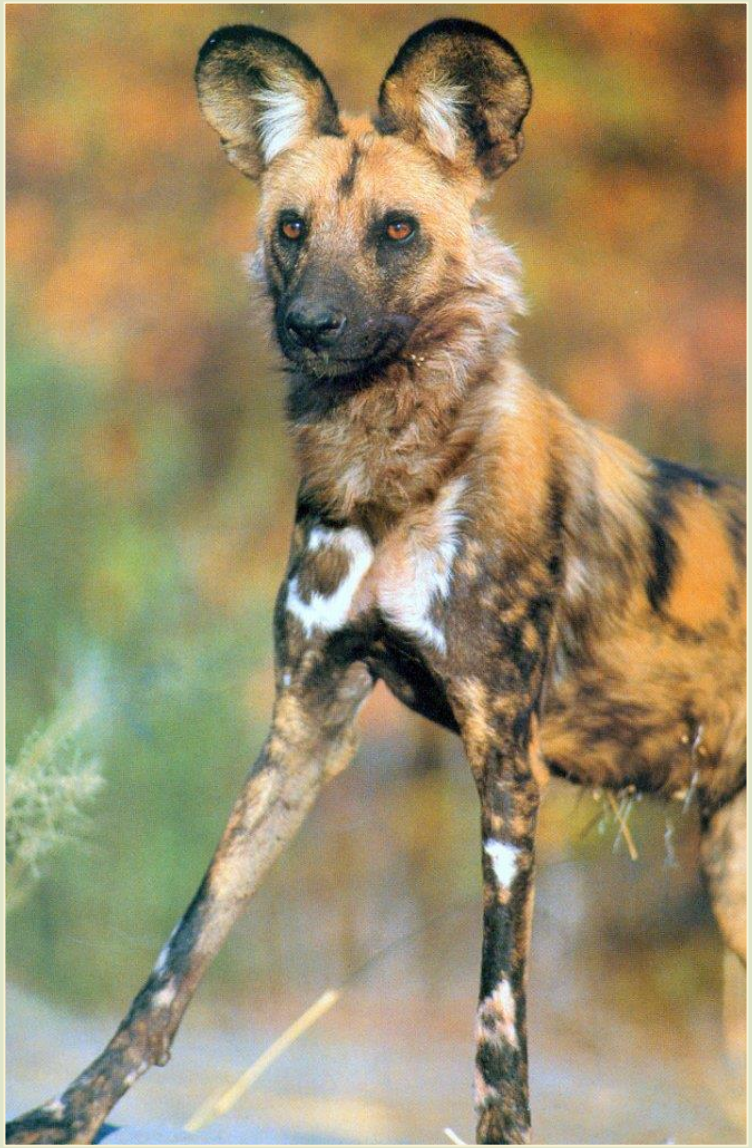
What happened to the Serengeti wild dogs?

- Declining since 1970
- 1989/90 - two of six remaining packs succumbed to rabies
- Two remaining packs were vaccinated
- All dogs disappeared by 1991

What happened to the Serengeti wild dogs?

Was it:

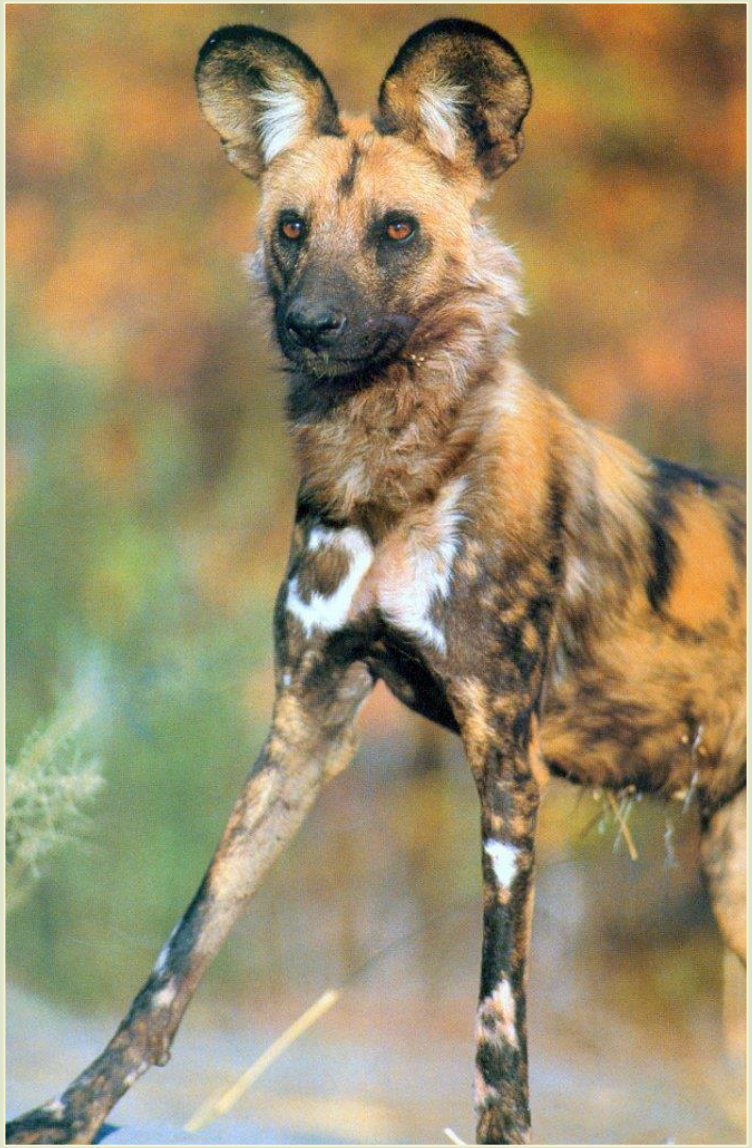
- Rabies?
- Stress?
- Small population size?
- Other disease (eg CDV)?
- Other factors (food shortage)?



What happened to the Serengeti wild dogs?

Example illustrates the issues with diseases and conservation:

- “Spill over”
- Often hard to know what’s happened
- May be a time lag
- Should we intervene?



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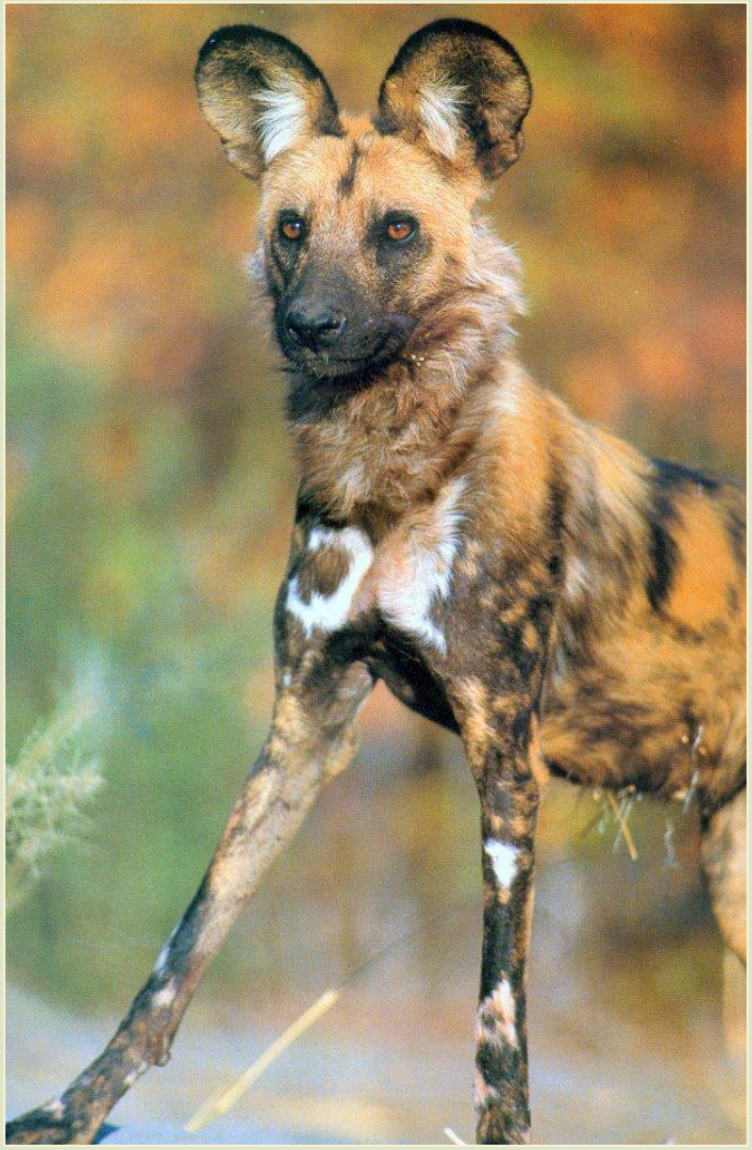
Focus here on micro-organisms, pathogens rather than parasites
Not going to go over transmission routes



Diseases can be a major conservation issue …

- Western gorillas listed by IUCN as critically endangered
- Declined by 60% in 25 years
  - 33% decline in 15 years due to Ebola

- Estimated 4% extinctions since 1500 caused by disease
- Up to 8% critically endangered species affected
- Probably under-reported

… it took 15 years to identify cause of deaths of amphibians

Amphibians started disappearing 1970s
Considered:

- Pesticides
- Increased UV
- Habitat disturbance
- Introduced predators

- Rare to find dead animals
- Required epidemiological outbreak investigation

But are there any positive sides to wildlife diseases?

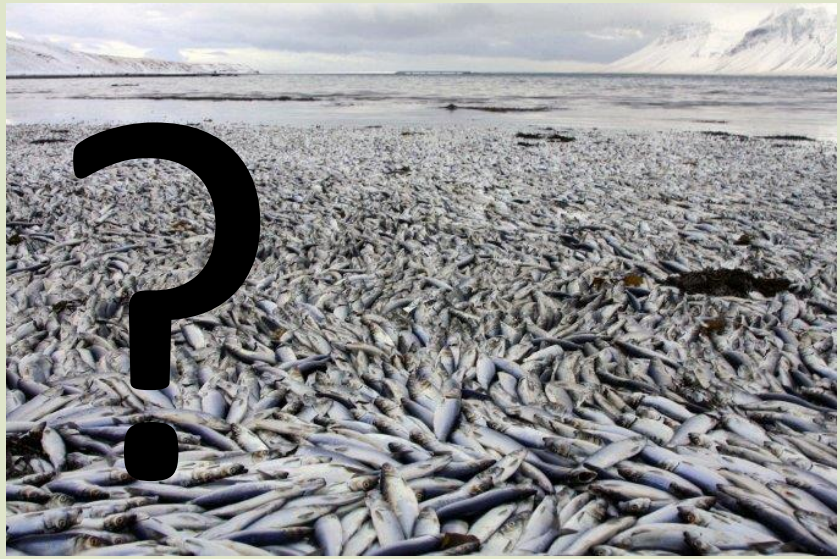
Top-down effects

Predation, car collisions, stochastic events, etc

Increased mortality

Compensatory mortality?

Additive mortality?



Population declines

Disease

Resource limitations, habitat loss, fragmentation, stochastic events, change in population structure, competition, poor nutrition etc

Decreased recruitment

Infertility?

Changes in sex ratio, age structure, behaviour, timing of breeding?

Bottom-up effects

True effect of disease likely to be more subtle and difficult to detect

“Emerging Infectious Diseases”

Three categories:

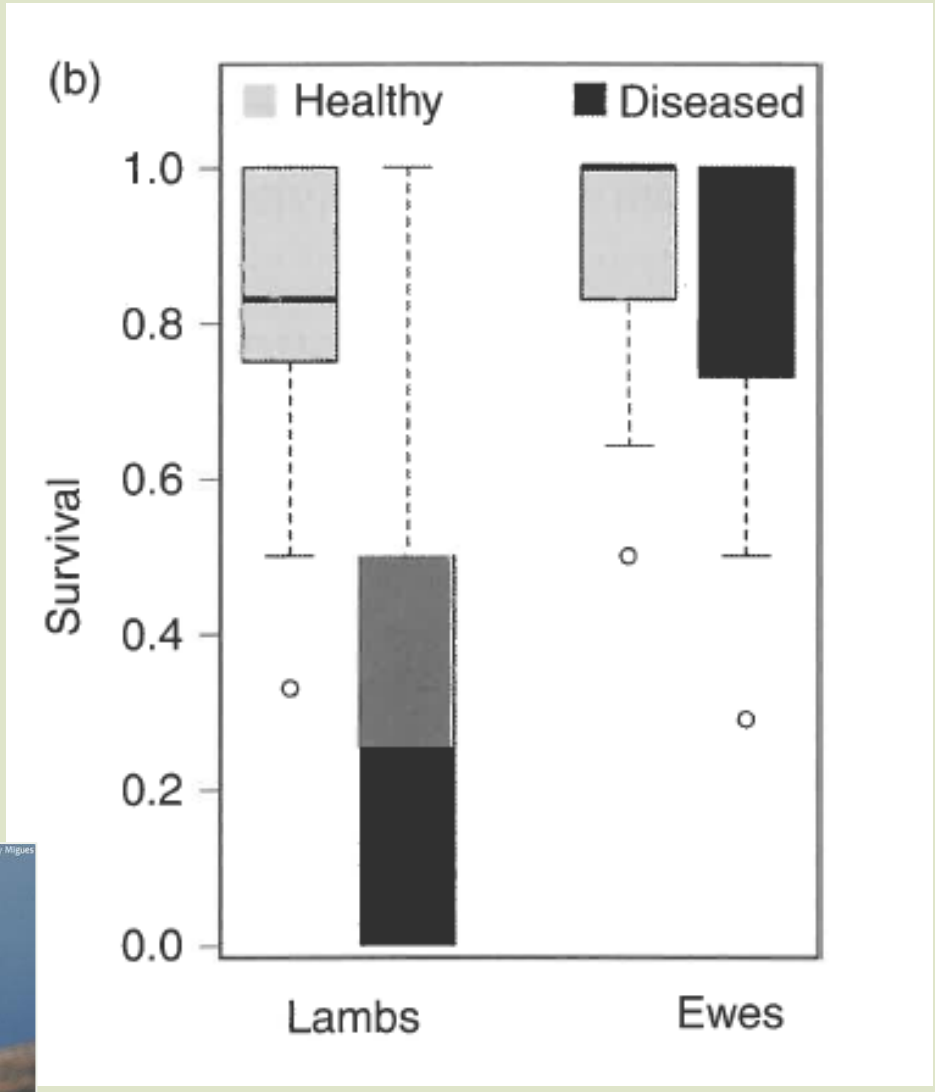
- Spill-over from domestic to wild animals → Canine distemper, Rinderpest
- Via human intervention → Numerous examples!
- No obvious human or domestic animal link → Chytridiomycosis?

- Bighorn sheep
- Pneumonia spillover from domestic sheep and goats
- Results in highly variable population growth
- Sometimes all-age die-offs
- Years to decades poor recruitment

Difficult because:

- Few long-term studies – common issue with diseases
- Little understanding of within / between host disease dynamics
- Little knowledge of immune response

- Most young animals recover in 1-2 years (= acute infections, sometimes fatal)
- Older animals tend to remain infected (= chronic infections)
- Suggests disease prevalence maintained by a few, older, persistent carriers



Super-spreaders .....

- West Nile virus
- Transmitted between birds and mosquitoes
- Sometimes affects mammals
- Species affected determined by mosquito feeding preferences
- Mosquitoes avoid house sparrows
- Prefer corvids but these are relatively rare

North American robin:
Wide-spread but relatively uncommon
Maybe most important amplification host

…. & super-shedders

- Known to occur in cattle with E. coli O157
- And in some amphibians
- Produce disproportionately large amounts of infectious material
- Responsible for large number of new infections

Atelopus zeteki Panamanian golden frog
Super-shedder of *Batrachochytrium dendrobatidis* (chytrid disease)
Highly susceptible, produce more spores than other species

Human activities can increase contact rates and host susceptibility rates

Effects on a host's ability to mount an immune response

- Stress
- Nutritional status
- Environmental pollution

- Habitat loss increases density of populations
- Increase incidence of pathogen in environment
- Reservoir species

What should we do?

Diseases are NATURAL

The dilemmas:

1. Protect all individuals or let natural selection take its course?
2. Is this about animal welfare or conservation of populations / species?
3. All options for action involve additional risks ….

What are the options?

But we saw the issues with the wild dogs….

Key topics text book has interesting chapter on this

- Vaccination
  - Gorillas (measles)
  - Black-footed ferrets (CDV)
- Rehabilitation
  - Harbour Seals (PDV)

Catch, nurse back to health
Is this about conservation?

- Translocation
- Control of disease in domestic stock
  - Rinderpest virus in southern & eastern Africa

Vaccines …

- can take a long time to develop
- are expensive
- resistant strains….

Catching animals can be difficult
Causes huge amounts of stress

Disease risks:
Take-home messages

Increasing need for field ecologists to be aware of signs of disease and be able to take appropriate samples

Need better understanding of the role played by disease in animal and plant populations

Reading

Primack: Chapter 10
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