

Impact of Multi-host Pathogens on Wildlife Populations

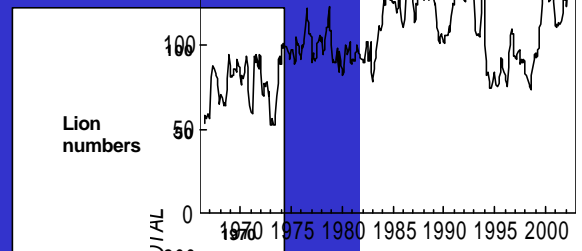
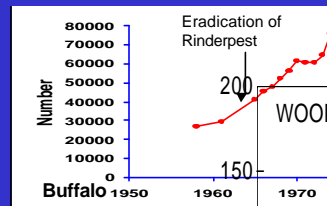
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Rinderpest

- Persisted into the 1950s in areas with large ungulate populations
- “Ring vaccination” of **cattle** around the Serengeti eradicated the last major **wildlife** reservoir

Ecological impacts of rinderpest

- Rinderpest had held most ungulate populations well below “carrying capacity”
- Predators increased with increasing number of prey



II. Impact of Disease Outbreaks

- Rinderpest in the 1890s: 80-90% mortality
 - Domestic stock as well as wild ungulates
 - Widespread human famine
 - Epidemic of man-eaters



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- Carnivore diseases:
 - Rabies – local extinctions

Rabies in Africa: a critical factor in the local extinction of Wild Canids



- Rabies associated with loss of 5 of 12 Wild Dog packs in Serengeti-Mara ecosystem between 1986-91.

Rabies also poses a significant threat to the Simian fox (Ethiopia)



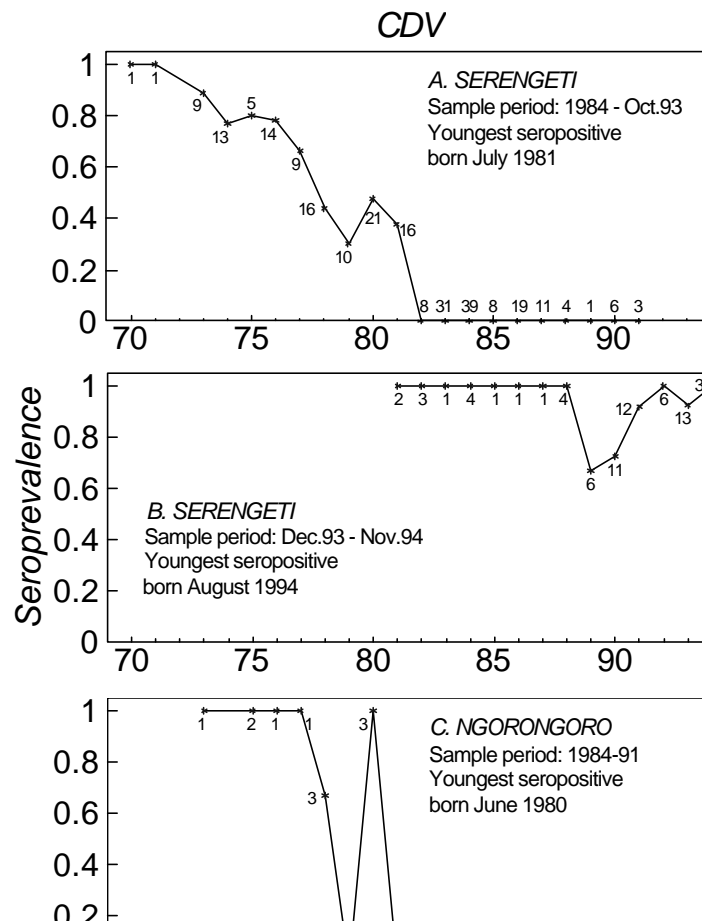
II. Impact of Disease Outbreaks

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 - Domestic stock as well as wild ungulates
 - Widespread human famine: “There were so many dead bodies lying around that the vultures forgot how to fly”
 - Epidemic of man-eaters
- Carnivore diseases:
 - Rabies – local extinctions
 - Canine Distemper – 0-40% mortality



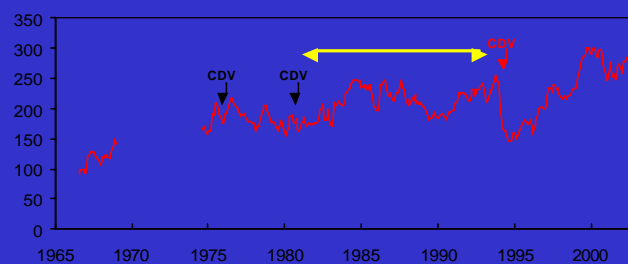
Serengeti Lion Die-off 1994

- About 1000 out of 3000 died within 6 mos
- Dozens were observed with convulsions and seizures; most just disappeared
- 5% of the survivors developed myoclonus
- 90+% of the survivors tested positive for canine distemper virus (CDV)



Canine Distemper

- Fatal to domestic dogs, jackals, wild dogs, bat-eared foxes, lions, leopards, hyenas.
- Disease spread mainly through aerosols.
- Survivors have life-long immunity



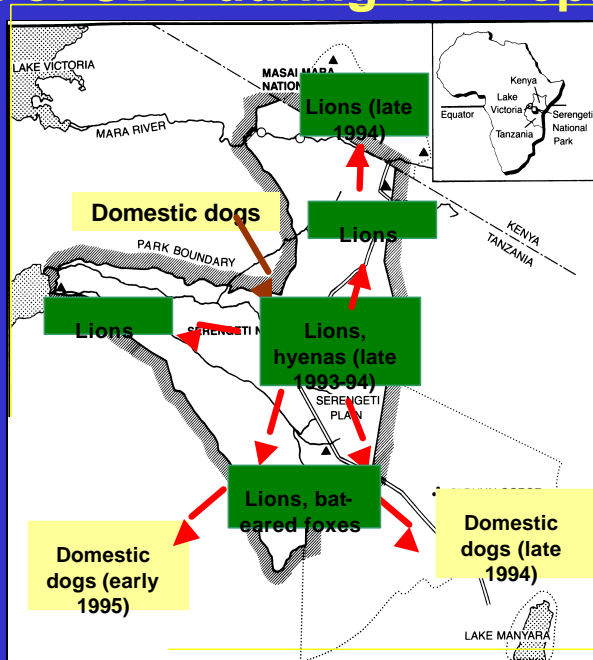
- Absent in lions for 13 yrs; wildlife unlikely reservoir



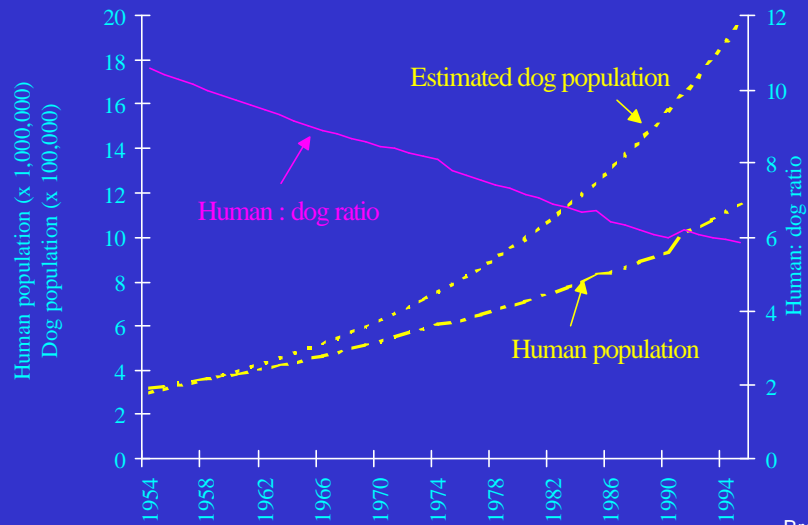
Frances Gulland



Spread of CDV during 1994 epidemic



Size of human and dog population in Zimbabwe (1954 - 1994)

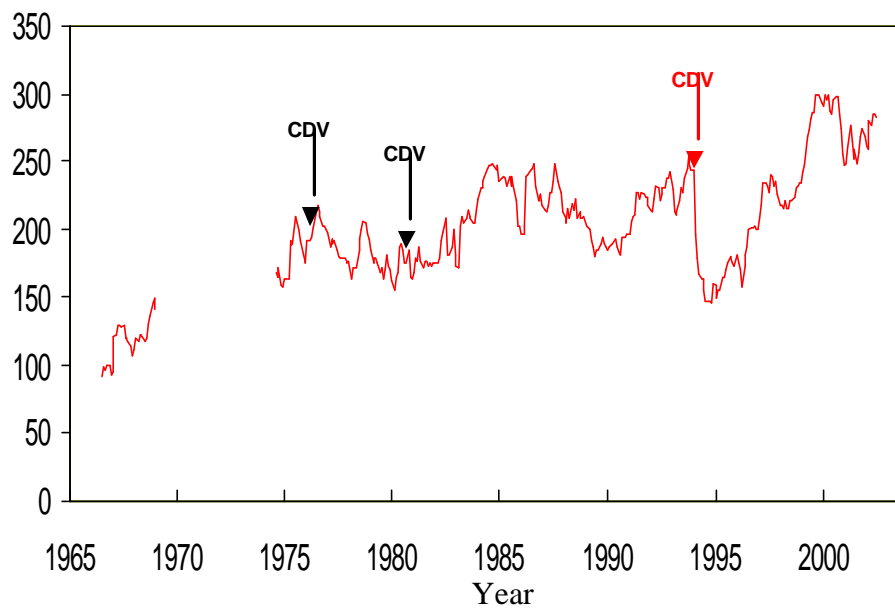


Brooks, 1990

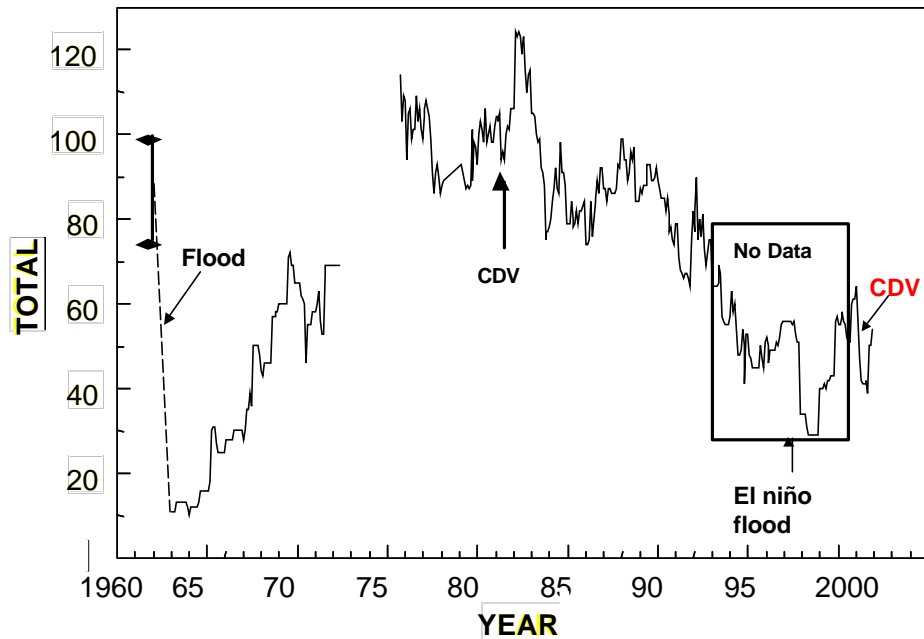


Why are some CDV outbreaks “hotter” than others?

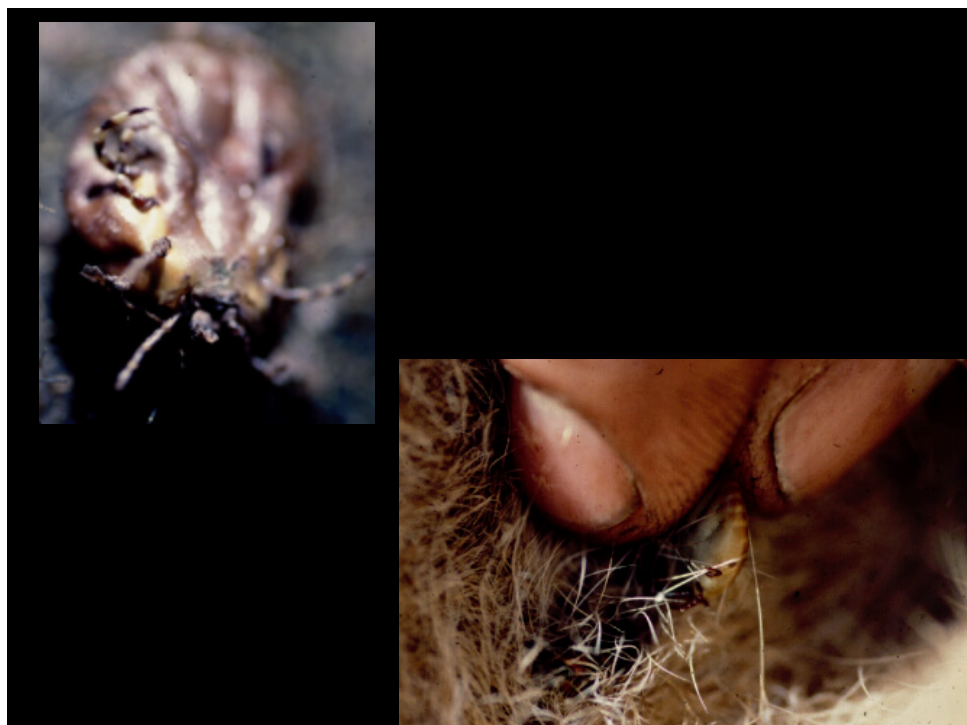
Lion population: Serengeti study area



Crater Lion Population



- 22 of 66 Crater lions died within 6 wks
- 90+% of survivors tested positive for CDV



Climate vs. Virulence

- 1994 Serengeti CDV outbreak coincided with heavy rains ending severe drought of 1993
- 2001 Crater CDV outbreak coincided with heavy rains ending severe drought of 2000
- Malnourished buffalo died in large numbers, shedding high numbers of ticks
- Lions feed on poor quality meat, tick infestation
- CDV is immunosuppressive – rendering lions vulnerable to tick-borne parasites

Pathogens of the Serengeti

Ecological factors pre-eminent

- Host population size
- Drought/Flood

