

EEB 2208: TOPIC 11

DISEASE

Background for this topic

Primack: Chapter 10 (second half)

Sodhi and Ehrlich: Chapter 7

A) INTRODUCTION

- i) Diseases affect a relatively small proportion of endangered species, compared to most of the things we have talked out. Nonetheless, 1 in 10 endangered vertebrates in the US are affected by disease. It is quite likely that the very low percentages for invertebrates and plants are a result of our poor knowledge of disease in these groups.
- ii) Probably the greatest threats come from emerging new diseases. Very often these will be diseases that are also introduced species.
- iii) Changing conditions can also result in new outbreaks of diseases that have been present in an area for a long time. For example, if changes in habitat availability concentrate individuals into a small area, the rate of transmission is likely to go up, making a large outbreak more likely.
- iv) The effects of existing diseases in an area can also be amplified by the fact that a species has become endangered through other means. For example, if a species is so rare that it must be brought into captivity, then it is likely to be exposed to diseases that it might not otherwise encounter. As populations decrease in size, they are likely to become more inbred (especially if in captivity), which might make them more vulnerable to disease. In fact, simply by having a small population a species is increasingly vulnerable to a disease outbreak, just because there are fewer individuals that are likely to have the genetic ability, overall good health, or simply good luck, to avoid succumbing to the disease.

B) EMERGING DISEASES

- i) Example: Chytrid disease in amphibians was only discovered in the late 1990s, but has rapidly spread worldwide and has caused rapid declines of many different species. A similar disease recently emerged in salamanders.
- ii) Example: Devil Facial Tumor Disease in Tasmanian devils was also discovered only in the 1990s. The disease is a cancer that can be transmitted from one individual to another (via bites during fighting). Almost all devils that get the cancer die and it is predicted that the disease will have spread throughout the entire range by the end of the decade. In areas where DFTD is present there have been declines of up to 90%.
- iii) Example: A century ago, the American chestnut was a dominant tree in eastern forests. Now it is almost entirely gone, due to the introduction of a fungal disease that kills mature trees. Chestnut blight was introduced to North America from Asia in 1904. It rapidly spread throughout the range of the tree in only a few decades. Chestnuts persist, but only in isolated places or as root sprouts.

C) CONTROLLING DISEASE

- i) In some cases it is possible to address disease problems through direct intervention.
- ii) Example: The Ethiopian wolf has a small population and has suffered serious declines due to rabies. Researchers, however, have shown that it should be possible to slow the spread of the disease by vaccinating as few as 30% of the animals in the population. The trick is to identify when/where outbreaks occur and then target those individuals that are most likely to contribute to disease spread (i.e., basic biological knowledge about the population is needed).
- iii) This study is important because vaccinating entire populations is often impractical, but the research suggests that it is not always necessary.