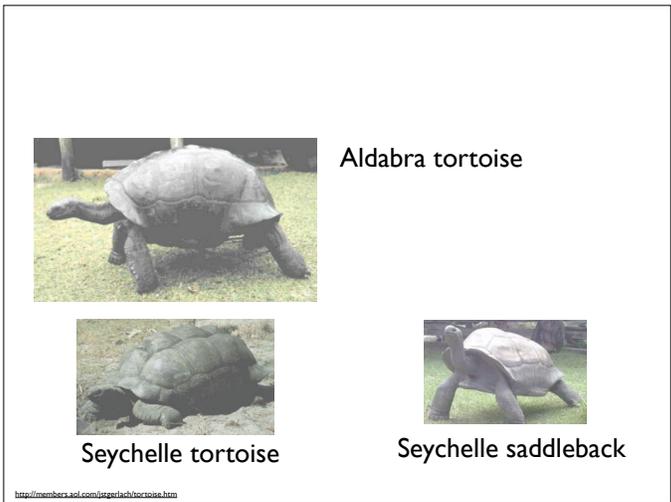
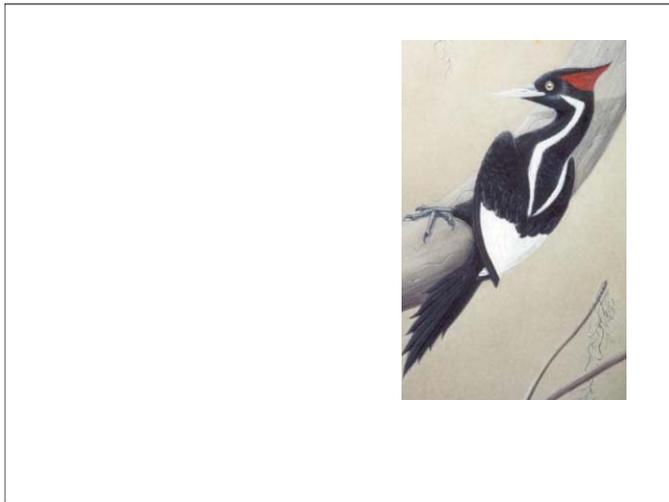


Table 2.2. A sample of species once thought extinct, but rediscovered.

Species name	Common name	Date		# yrs since
		rediscovered	last sighting	
<i>Dipsochelys hololissa</i>	Seychelles giant tortoise	1997	>150	
<i>Pterodroma cahow</i>	Bermuda petrel	1951	>300	
<i>Perameles bougainville</i>	Western barred bandicoot	1983	61	
<i>Trichocichla rufa</i>	Long-legged warbler	2003	109	
<i>Gastrolobium lehmannii</i>	Cranbrook pea	2001	83	
<i>Hapalopsittaca fuertesi</i>	Fuertes's parrot	2002	91	
<i>Hypsiprinus gilbertii</i>	Gilbert's potoroo	1994	85	
<i>Sida inflexa</i>	Virginia pine sida	1999	31	
<i>Lepidoprix</i> (formerly <i>Pipra</i>) <i>vilaboasi</i>	Golden crowned manakin	2002	45	





Measuring Current Extinctions

- Direct observation are difficult
- Indirect observation: species - area relationship

Species-Area relationship

Number of species S

Area A

$$S = c \times A^z$$

c is a taxon specific constant
z is the extinction coefficient
z is in the range 0.1 to 0.3

Species-Area relationship

log(Number of species S)

log(Area A)

$$S = c \times A^z$$

c is a taxon specific constant
z is estimated using the slope

SUNDA ISLANDS

Mac Arthur and Wilson (1967):
the theory of island biogeography

FIGURE 9. The numbers of land and fresh-water bird species on various islands and archipelagos of the Sunda group, together with the Philippines and New Guinea. The islands and archipelagos are grouped close to one another and to the Asian continent and Greater Sunda group, where most of the species live; and the distance effect is not apparent. Christmas, 1; Bawean, 2; Engano, 3; Savu, 4; Simalur, 5; Alors, 6; Wetar, 7; Nias, 8; Lombok, 9; Billiton, 10; Mentawai, 11; Bali, 12; Sumba, 13; Bangka, 14; Flores, 15; Sumbawa, 16; Timor, 17; Java, 18; Celebes, 19; Philippines, 20; Sumatra, 21; Borneo, 22; New Guinea, 23. (Modified from MacArthur and Wilson, 1963.)

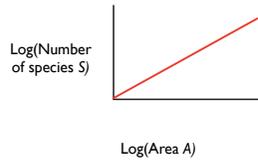
Fig 4.5 Small mammals in forest

granivores

all small mammals

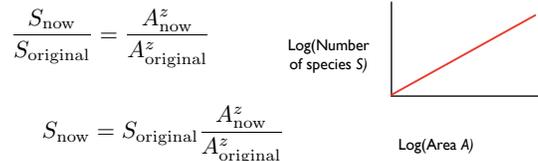
$r^2 = \text{proportion of variation explained}$

Estimating extinction rates



$$\frac{S_{\text{now}}}{S_{\text{original}}} = \frac{cA_{\text{now}}^z}{cA_{\text{original}}^z}$$

Estimating how many species go extinct



$$\frac{S_{\text{now}}}{S_{\text{original}}} = \frac{A_{\text{now}}^z}{A_{\text{original}}^z}$$

$$S_{\text{now}} = S_{\text{original}} \frac{A_{\text{now}}^z}{A_{\text{original}}^z}$$

using

$z = .15$ (this is arbitrary)

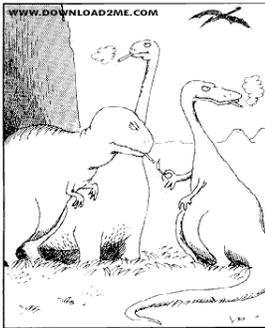
deforestation = 1.8% per year ($A_{\text{now}} / A_{\text{original}} = 98.2/100$)

10 million species (S_{original})

$S_{\text{now}} = 9,973,000$

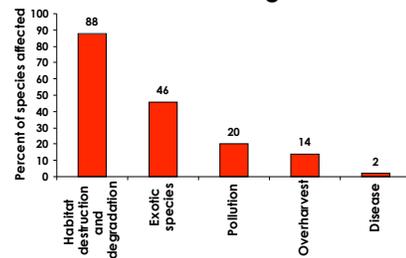
Difference between S_{now} and $S_{\text{original}} = 27,000$ species per year

Causes of extinction?

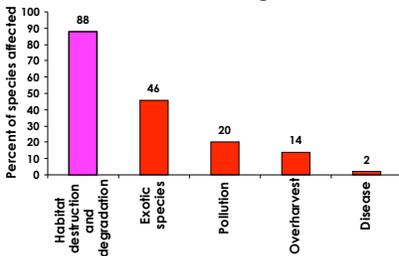


The real reason dinosaurs became extinct

Causes of endangerment



Causes of endangerment



Causes of extinction

■ Habitat destruction

■ habitat loss (less area = fewer species)

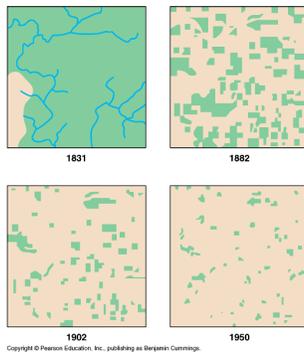


Causes of extinction

- Habitat destruction
 - habitat loss (less area = fewer species)
 - habitat fragmentation

Fig 55.6

Forest cover of
Cadiz Township in
Wisconsin

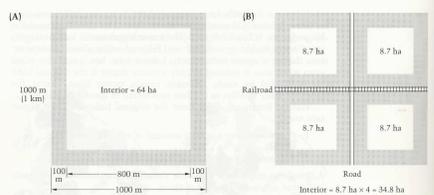


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Causes of extinction

- Habitat destruction
 - habitat loss (less area = fewer species)
 - habitat fragmentation
 - Edge effects

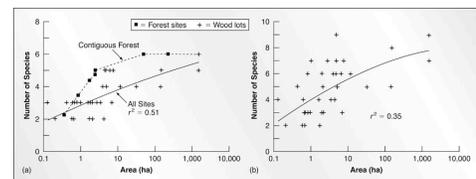
Fragmentation



6.14 A hypothetical example shows how habitat area is severely reduced by fragmentation and edge effects. (A) A 1-km² protected area. Assuming edge effects (gray) penetrate 100 m into the reserve, approximately 64 ha are available as usable habitat for nesting birds. (B) The bissection of the reserve by a road and a railway, although taking up little in actual area, extends the edge effects so that almost half the breeding habitat is destroyed.

Fig 4.5

Small mammals in forest



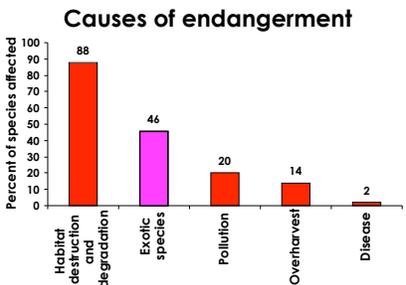
granivores

all small mammals

r^2 = proportion of variation explained

Causes of extinction

- Habitat destruction
 - Habitat loss (less area = fewer species)
 - Habitat fragmentation
 - Edge effects
 - Isolation



Exotic species

- Exotic species: species introduced to regions outside of their native range
- Invasive species: an exotic species with strongly increasing populations (and most often detrimental effect on the native species or habitats)

Exotic species



Invasive species



Introduced to Guam, predated and eradicated all native endemic bird species

Introduced to the South-East USA for their edible leaves and pretty flowers. Overgrowing forests, changing native habitats

Introduced through boats into Great Lakes, clogging up water intakes, removing food more effective out of water column than natives.

Pollution

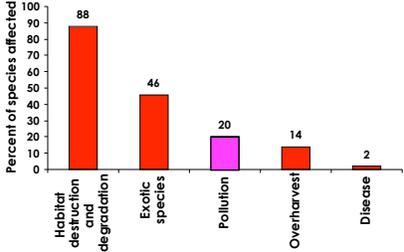
Point sources



Non-Point sources

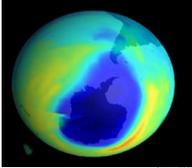


Causes of endangerment



Pollution

- Air
- Global warming
- Acid rain
- Ozone depletion, smog,



Pollution

■ Water



Heavy metal

Water Body	Species	Women of childbearing age, young children	All Other Individuals (# of meals)*
Lake Iamonia	Largemouth Bass	One per month	One per week
Lake Jackson	Black Crappie, Bluegill, Largemouth Bass	One per month	One per week
Lake Miccosukee	Bluegill, Largemouth Bass	Two per week One per month	Two per week One per week
Lake Munson	Black Crappie, Redear Sunfish	One per month	One per week
Moore Lake	Largemouth Bass	One per month	One per week

<http://www.myfloridath.com/community/fishconsumptionandfisheriesFWFGuide.htm>

Pollution

- Water
- Toxins
- Nutrients
- eutrophic vs oligotrophic



PRESS RELEASE, JULY 26, 2004
LOUISIANA UNIVERSITIES MARINE CONSORTIUM
AVERAGE SIZE "DEAD ZONE" IN ANYTHING BUT AN AVERAGE YEAR

The coast-wide extent of the Louisiana "dead zone" mapped this week is slightly larger than average at 15,040 km² (5,800 square miles). The long-term average since mapping began in 1985 is 13,000 km² (5,000 square miles). The river flow and the offshore conditions prior to the mapping cruise were anything but normal and were more reminiscent of the Great Mississippi River Flood of 1993. The river in 2004 peaked in discharge several times in January, February, March and May, followed by a prolonged above average flow that persisted from June into July, as in 1993.

Exploitation

Commercial



Recreational



Incidental Exploitation

- Bycatch: albatross, whales, ...
- Predator control in parks
- Recreation
- Pets

Diseases

- Chytrid, a fungus, is believed to be one of the sources for amphibian decline



www.clemetzo.com/conservation/project_golden_frog.asp

Causes of extinction

- Habitat destruction
- Exotic species
- Pollution
- Exploitation
- Diseases