durrell

Aurochs and Analogues

Can we replace extinct species with similar extant ones?

Analogue Species

- Ecologically similar
- Taxonomically close
- Conservation value

Re-wilding projects

- Interest in replacing extinct mega-fauna of North America.
- Replacing extinct Lions and Cheetahs.
- Elephants to replace Mammoths.

- Re-activating lost ecological interactions.

Many precedents

- Introduction of different sub-species to replace lost one.
- Back-crossing domestic animals to get back to wild form.

- Use conservation introductions to restore lost ecological interactions.

Species may adapt to fit the vacant niche

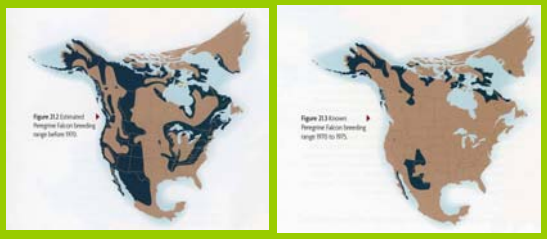
- Species can adapt to new habitats by natural selection.
- Sparrows introduced to North America had changed and were obeying expected bio-geographical principles in 50-90 generations.
- Honeycreepers changed bill morphology in a century in response to changes in community structure.

Species can express great variation over time

Peregrine Falcon

- Died out in the Eastern United States in the 1960's due to DDT poisoning.

Peregrine Falcon Distribution



- Peregrine Falcons introduced from six different subspecies.
- Releases in the late 1970's and 1980's.
- Races very dissimilar to eastern race rapidly selected against.
- Within a few generations the resulting falcon phenotypically similar to extinct race

Resurrecting the Auroch

- Wild ancestor of the modern cow.
- Extinct since 1627.
- Some old breeds contain some features of wild Auroch?

British White Park Cattle

- Wild cattle enclosed in British parks since 1220.
- Derived from feral cattle, Aurochs or their hybrids?
- Selection for white animals.
- Behave like wild animals.

Modern Aurochs

- Selective cross breeding of several primitive breeds.
- Breeding started in 1921, first at Munich Zoo and later at the Berlin Zoo.
- By 1932 were breeding true to type and similar to Aurochs!

Tarpan

- European wild horse.
- Extinct 1820 or later.
- Last animals in Polish forests where they crossed with domestic ponies.
- 1920's all Tarpan like horses gathered up to try and breed back to wild type.

Konik Horses

- Tarpan hybrids crossed with closely related Przewalski wild horses.
- Resultant Konik horses breed true to type and are said to be 98% Tarpan.
- These and Aurochs being used to graze natural grasslands.

Quagga

- Last one died in captivity in 1883.
- mtDNA studies demonstrate that it is a race of Burchell's Zebra.
- These show a north south cline with the stripes becoming more prominent in northern races.

Burchell's Zebra to Quagga

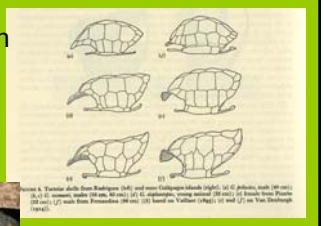


Replacing Extinct Mascarene Tortoises

- Radiation of *Cylindrapsis* tortoises in the Mascarene Islands. All five species extinct.
- Can we find suitable species to replace these?

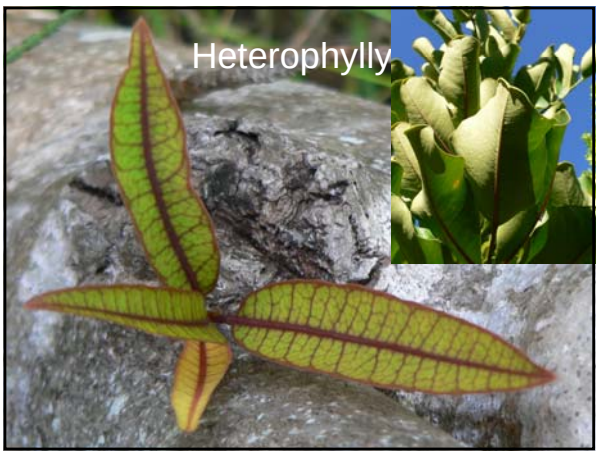
Analogue Species

Convergence between Mascarene and Galapagos Tortoises.

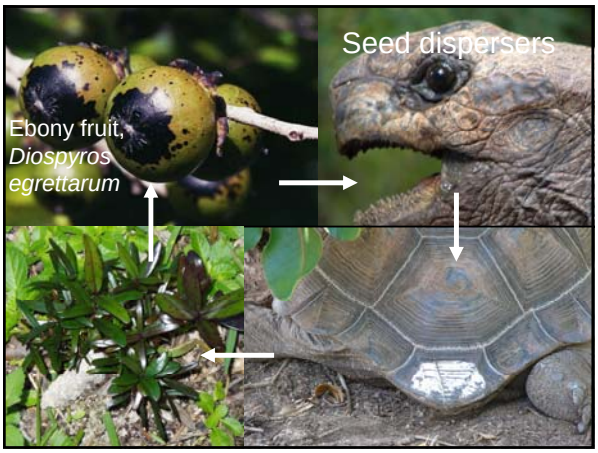



Replacing endemic tortoises

1. Endemic plants co-evolved with the tortoises.
2. Many plants show possible adaptations to tortoise herbivory – prostrate growth forms, heterophylly, unpalatable, resistant to trampling, seeds spread by tortoises.
3. Some species decline when grazing is removed, *Aerva congesta, Phylanthus revaughanii, Vetiveria arguta.*



Prostrate growing plants that were part of the tortoise grazing climax community now Critically Endangered.



Can Exotic Tortoises Replace the Extinct Species?

- Three surviving tortoises in the Indian Ocean believed to be in a sister clade to *Cylindrapsis*. Ploughshare Tortoise, Radiated Tortoise and Aldabra Tortoise.

Aldabra Tortoises create "tortoise lawns", selectively graze some species, and avoid others, spread seeds of endemic species.

Aldabra Tortoises successfully introduced to some Seychelles Islands.

Some justification for conservation introduction of rare tortoises

Aldabra Giant Tortoise

- Small herd of 20 adults on Ile aux Aigrettes
- Successfully breeding
- Studying impacts on plant community
- A suitable replacement for extinct species?

Tussock Grass Community

- The endemic grass *Vetiveria arguata*, that survived when there were rabbits on the island, is being replaced by exotic grasses.
- *Vetiveria arguta* has adaptations to discourage grazing and was probably a component of the grazing climax community.
- There is a need to replace the rabbits with a less harmful herbivore.

Tussock Grass Community

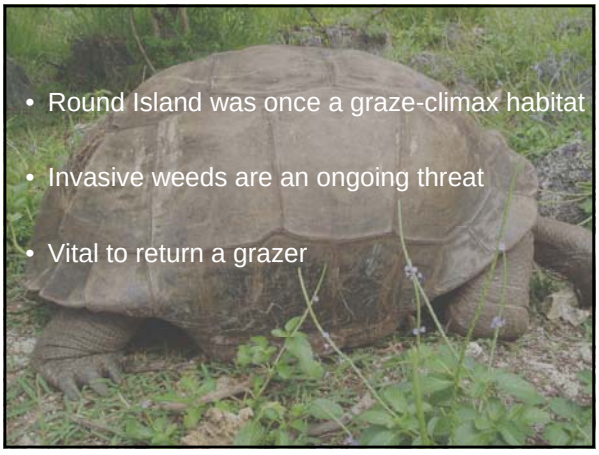
- *Vetiveria arguta* used to form large tussock formations.
- Tussocks used by seabirds as nesting sites.
- Tussocks important habitat for Telfair's Skink, Bojer's Skink and Round Island Boa.
- *Vetiveria* now declining rapidly and likely to become extinct on Round Island without some grazing pressure.

Round Island and the need for tortoises

- Record of a tortoise in 1844 (Lloyd)
- Today there is no grazer
- Invasive species are the greatest threat to the native flora
- Tortoises will preferentially graze invasive species

Tortoise Translocation

- Minimal risk of spread of disease – strict quarantining and disease screening
- Easily removed with minimal impact
- No risk of reproducing – sub-adult tortoises



Future possible analogues

durrell

Galapagos Tortoises, awakening the dead

- Should we return tortoises to Pinta, Santa Fe, Floreana and Fernandina?
- Can we use other taxa to replace the extinct ones?
- Is it important to restore the role of grazers, browsers and seed dispersers?

Santiago Land Iguana

- Iguana's present, noted by Darwin.
- Extinct by 1906
- Do we need to replace it.