The Madagascan parrot was abundant and widespread until 1650 when human populations started to increase.  By the 1900s, only five sites remained and by the 1940s the parrots were only found in one location.  They feed on flowers, fruit, leaves, bark and nectar.

Historic declines were probably due to large-scale loss of forests, capture for the pet trade and food, shooting to prevent damage to crops and mortality due to typhoons.

Typhoons hit the region on average every 50-60 years but 2 hit in the 27-year study period.  Typhoons appear to have an indirect impact on the population size of parrots with greater impact occurring immediately after the storms rather than during the storm itself.  However, typhoons create natural cavities by blowing trees down and tearing off tree branches.

Conservation activities have been underway for the last 30 years but there has been little increase beyond a core population of 25-40 birds.

The parrots remain together as pairs until one partner dies but will then quickly find a new partner. Parrots don’t breed every year and in Madagascan parrots this results in a high proportion of non-breeders every year.  Even though there are now 40 birds, in any one year there are only 3-5 breeding pairs.

One parrot pair laid 43 eggs between 1975 and 1984, of which 75% failed to hatch due to thin or malformed shells.  When the surviving member of 6 pairs of parrots with very low hatchability (26-80%) re-mated following the death of their partner, hatchability increased to 90-100%.  When members of 8 pairs of parrots with high hatchability (> 80%) re-mated, for 3 of the pairs, hatchability decreased strongly; for 2 pairs it decreased slightly and for 3 pairs remained unchanged.

New nest cavities were created by reserve managers.  By 2000, there were over 80 cavities that were suitable for parrots to nest in.

Predation of eggs and chicks is generally low – less than 5% of eggs and chicks are lost in this way.

Of 57 wild nestlings caught and sexed between 1992 and 2000, 31 were male and 26 were female.

Little is known about the social systems of these parrots and whether there are interactions between breeding and non-breeding pairs.

6.This small cactus has cylindrical, mostly single sterns up to 20 cm tall.  It inhabits low-elevation desert grasslands or sparsely vegetated shrublands on gravelly flats and terraces within the Chihuahuan Desert.

It flowers from March ­ July;  the cactus' pollinators are unknown, but native bees are thought to be the primary mechanism of pollen transport between plants.  Fruits mature from May-August.

The only known disperser of seeds is the collared peccary *(Tayassu tajacu),*a type of wild pig*.*Peccaries eat the fruits fallen below the adult cactus and defecate the seeds elsewhere.  Some very limited vegetative reproduction also occurs.

It's been suggested that a reduction in the number of peccaries has resulted in declines in the cactus populations.  Each year since 2005, a team of volunteers walked the same transects through this desert area and counted the number of new colonies of the cactus that they saw.  For each area, they calculated the percentage change in peccaries over the 10 year period.  Data from the 1950s suggests that about 4 new colonies were detected every year.  Sketch a graph either by hand or by making up data on Excel to show the shape of graph you would expect to see if reduced numbers of peccaries is leading to reduced seed dispersal and thus lower numbers of new colonies of cactus.  Make sure you label your graph clearly and take a screen shot or photo and upload here.  Think carefully about how to show percentage change on your graph .... eg what happens when peccary numbers increase, what happens when they decrease?

The gris-gris is a small Australian marsupial. It never had a wide distribution but it started disappearing from parts of its range in the late 1800s.  By 1980 there were just a few small populations left in forest reserves.  They only eat termites and use fallen trees for shelter.  Natural predators include raptors and reptiles.

Feral cats arrived in the areas where gris-gris lived in the late 1800s and red foxes were present from around 1950, introduced to control rabbits.  Rabbits were controlled by poisoning until the 1970s.  The Aboriginal peoples who lived in these areas historically left their lands around this time and this may have resulted in changes in management crucial for the gris-gris.

Use the evidence here to suggest in no more than 100 words, the key factors likely to be affecting this species.

8.

The Venezulan grebe was flightless, endemic to a few high altitude lakes.  Grebes are freshwater diving birds highly specialised for diving.  Their legs are set far back on their bodies to maximise their underwater swimming ability.

Population: first recorded in 1920; described as ‘abundant’ in 1945; 300 recorded in 1968; 1 seen in 1972; 1 seen in 1977; extensive searches in 1981 did not find any birds and it is now considered to be extinct.

Habitat: thought to have been found throughout wetland areas, by 1975 known only from one lake (56 km2).  This is now the only large lake remaining that supports populations of water-birds.  Much of the area has been drained for pasture, eucalyptus plantations and vegetable production.  The few reservoirs do not provide suitable habitat for these grebes.  Smaller lakes have mostly become overgrown with tall emergent or floating vegetation, silted up from erosion or contaminated by sewage.  From the 1980s, the principle crop in these areas has been onions and these require large amounts of pesticides which sometimes run off into surrounding watercourses.

In 1981, extensive surveys carried out to try and locate the birds describe the lake as mostly clear water but sedimentation and nutrient additions from farmland had reduced the water quality in a few places.  In the 1970s the submergent vegetation was described as a mixed species, open community; by 1981 it was dominated by a dense monoculture of Canadian pondweed (Elodea canadensis).

10.

he golden-headed finch used to be widely distributed on the island of Harkness in the mid-Atlantic although it has never been a common species.  Numbers have reduced to such an extent that it is now listed as one of the 150 most critically endangered species of bird in the world.

Golden-headed finch feed almost exclusively on the flowers and seed pods of the endemic long-pod tree once found across the island.  Much of the lowland forest on Harkness has been cleared for farms and this tree is now restricted to dry montane and sub-alpine areas of Harkness.

Golden-headed finch are now only found in long-pod forests on the slopes of the extinct volcano.  Cattle grazed these forests until 1931, then the area was grazed by sheep; this stopped in 1982 but feral goats and wild sheep still use these areas.  Overall, the level of grazing has reduced considerably.  Grazers tended to avoid the other tree found in these habitats, the cut-leaf spine-tree so mature spine-trees are now commoner than long-pod trees.  Historic browsing on long-pod trees had resulted in multi-stemmed trees with smaller, more tightly packed branches that make it harder for golden-headed finch to access flowers and seed pods.  Much of ground flora of the forest area is now dominated by introduced, deciduous grass species.

As well as habitat losses, long-pod development is clearly linked with rainfall; drought decreases long-pod trees and increases cover of invasive deciduous grasses..  Since June 2006, 52 out of 54 months have been recorded as suffering drought.

Nest monitoring showed that breeding success was very low – only 25% of nests fledged one chick or more.  In almost half of nests, the eggs didn’t hatch or they were deserted by the parent birds.  Almost 20% of eggs were infertile or the embryo died.  Nesting success declined through the breeding season.

Various introduced predators are widely found in the forests – mongooses, feral cats and rats.  An experiment to look at predation using quail eggs in artificial nests showed that black rats were the only predator but they didn't take very many eggs.

Mosquitoes which carry avian cholera are found in one forest area used by the golden-headed finch.

DNA fingerprinting suggests that breeding pairs are rarely related.  The populations appear to have a relatively high effective population size.

Use the information provided here to select the cause/s of the decline in golden-headed finch.