

## **Zoos...**

Suppose all else fails, then we start looking at zoos. But before we do, we need to look at the role of zoos a bit more (your text glosses over some of the other aspects of zoos).

### **I. Recreation**

The reason for the existence of zoos is almost undoubtedly recreation.

Wild animals (and to a lesser extent plants) have intrigued folks for centuries. Numerous rulers and kings have collected animals.

An obvious example is the Roman Empire where lots of exotic animals were brought in for display (as well as the arena, of course).

Other examples dot history.

Even today, it's estimated that in the U.S. zoos attract more people annually than all major league sports combined.

The main reason to go to zoos is to look at animals, have fun, etc.

### **II. Education**

Quite some time ago, zoos realized that they need to start educating the public.

These days, things like a "chimpanzees tea party" are out. Instead, zoos try to use a setting that approximates the natural habitat of the species.

In addition, there are numerous plaques, signs and presentations discussing the status of species.

Endangered species are often singled out with special signs or other advertisement.

For many people, their only knowledge of deforestation, pollution, or other things comes from zoos, so this is an important job.

As such, "advertising" the plight of the natural world and getting support for conservation is one critical.

### **III. Research**

Much important research takes place in zoos. One has to be careful with the applicability of this research, however.

Physiology, diseases, nutrition, reproductive biology, etc. are often cited as important research going on in zoos.

Obviously, ecology, some natural history, behavior, etc. are examples of research in which the results may be less applicable to wild populations.

Even with the above mentioned topics, though, there can be problems:

Diseases - are the ones in zoos the same as in wild populations?

Reproductive biology - does this work the same? Food or behavior can have strong impacts on what happens reproductively, and if this is somehow dissimilar, then the results may differ than in wild populations.

Nutrition - obviously, what they eat in captivity may be totally different from what they eat in the wild (e.g., "cat diet" given to cheetahs).

Physiology - one simple example is that captive populations are not as active as wild populations (and live much longer). This has obvious impacts on physiology.

Important - this is not to say that research done in zoos is useless - quite the contrary. It's extremely important. It's just that using the results of research done in zoos on wild populations has to be done with care.

An obvious example of zoo research being quite useful is in the development of tranquilizers.

#### **IV. Conservation**

Finally we get to the role of zoos in conservation. Obviously, this is only one role that zoos have.

The basic idea here is to breed animals:

- to preserve a species.
- to build up a species for its possible return to the wild (or to augment wild populations).
- so that zoos can display a species without removing it from the wild.

When to take animals into captivity?

- not many guidelines exist.
- obviously, this should happen before the population is so small that capture will accelerate a decline (i.e., that capture contributes to the decline).
  - again, the obvious exception of populations faced with imminent extinction due to extremely low population numbers (i.e., catch all that remain).
  - but, if a particular animal is difficult to catch, then maybe one shouldn't wait until one is down to the last few individuals (or you may not catch any!).
  - very low numbers also make it difficult to get needed information on breeding, feeding, etc. (stuff one needs to do in captivity).
- often taking animals into captivity is a stop-gap measure. One hopes to remove the cause of the decline, but to prevent a further drop in numbers the population is removed to captivity.
  - several of the birds affected by the brown tree snake were removed into captivity.
    - the brown tree snake is still there (and unlikely to go anywhere).
    - nevertheless, translocating the birds to a different island seems to have worked.
- when taking an animal into captivity, one needs to keep in mind that one may do more harm than good, particularly little is known about breeding the animal.

#### Captive breeding:

- not the answer to everything:
  - for example, zoos just don't have the capacity for dealing with all the endangered species in the world. The text points out that breeding programs for pink pigeons and hutias ground to a halt after zoos ran out of space.
  - this is exacerbated by the fact that zoos concentrate on large mammals. In fairness, this is a little bit of a public perception

issue:

- giant pandas are cuddlier than giant anacondas.
- if you want to raise money, use pandas, not anacondas.
- main difficulties facing captive breeding (other than space):
  - balancing the number of individuals with genetic management. Sometimes the overriding concern is getting numbers back up, in which case genetic management is secondary.
  - time and expense. It takes time to breed animals, it takes time to become successful at it, etc.
    - it can also be expensive. Figures on the golden lion tamarin for 1984 - 1989 are close to 3 million dollars. It is true, though, that the golden lion tamarin is a success story for captive breeding (we don't know what to do with all the tamarins now). Release programs seem to be working.
- does one do captive breeding on site or in zoos?
  - depends. If it appears that the local area will do well, then that should probably be used.
  - if difficulties are expected (i.e., no one knows about breeding behavior or nutrition), then the animals should probably be moved to a zoo.
    - zoos have more experience, technical know-how, and facilities to deal with difficulties.
- sometimes, local conditions don't help:
  - the Mauritius kestrel was fed with a "native" diet of mice and lizards. Unfortunately the problem was with organochlorides, so removal to captivity didn't help the kestrel at all (egg shell thinning still happened).
  - There's a reference to Cheetah breeding success, but there seems to be no recent mention of this example.

Captive raising:

Two methods predominate:

Cross fostering:

- removing eggs from the wild and using related species for incubation. The problem here is that imprinting can be difficult to avoid, and if the young imprint on the wrong species, one could be making the situation worse.

- black stilts simply followed their foster parents on migration. Oops.

- experimentation is useful here (try different things, as long as populations numbers aren't critically low).

Head starting:

- starting a species and then releasing lots of young - often it is the very young that are most at risk, so if these can be protected, the theory is that perhaps survival will go up.

- turtle eggs - letting turtle eggs hatch in captivity, perhaps letting them grow a little, and then releasing them into the wild (e.g., even helping hatchlings into the ocean might be considered helping).

- evidence that this works is conflicted.

- Kemp's ridley sea turtle, for instance, used to be most strongly affected by shrimpers. Augmenting juvenile populations didn't seem to help (besides, juvenile mortality wasn't that bad for this turtle).

- turtle numbers are showing signs of recovery.

- note again the emphasis on knowing the cause (and treating this cause) of the decline.

Mauritius kestrel (again):

- illustrates another problem - sometimes you don't want to raise an animal with it's parents

- kestrels raised by kestrels did not disperse, and the habitat was already saturated with kestrels.

- kestrels raised in captivity adapted to other types of habitat and are helping the species to recover.

Annoying fact - sometimes it's hard to know exactly what to do.

Translocation:

Here we're interested in moving animals for any number of reasons:

- establish new populations
- introduce a species (controversial)
- repatriate a species (put it back to where it once was)
- build up a species

None of this will work if the cause of the original population's decline has not been taken care of:

- Translocations of the Laysan rail were unsuccessful because the islands they were moved to had the same problem (too many rabbits) as the place they came from.

Sometimes, one translocates animals because it is impossible to treat the cause of the decline.

- New Zealand has had a lot of success moving animals to predator free islands.
  - black rats had already exterminated a number of species, and are quite impossible to control on the mainland.
  - But on some of the islands, black rats could be exterminated.

If the cause of the decline is treated, it has to be done effectively:

- a small wallaby in Australia was released into a fenced enclosure. Despite the fence, poisonings and shootings, predators still prevented the population from recovering.

Sometimes we don't know if the treatment worked:

- small test releases can be done if there are enough individuals

around to permit this:

- a few endangered snails were released to test for the presence of predators (yes, the predators were still there).

Releasing animals into their former habitat also highlights other problems:

- the original habitat may have changed (sometimes in complex ways).

- even if the cause of the decline is treated, the habitat may not revert to what was there (it may change due to other interactions that have been set up).

- the swift fox in Canada illustrates this:

- disappeared from prairies by 1900's, due to poisoning and demand for pelts.

- ranchers since then have shot up ground squirrels and badgers (whose burrows were used as escape holes by the foxes).

- grizzly bears and wolves were exterminated, which decreased scavenging opportunities.

- as wolves decreased, coyotes increased (coyotes like foxes!).

- so when swift foxes were re-introduced, a lot of stuff worked against them.

- it does appear that some of them might be surviving, however (but numbers are not what was hoped for).

- on the other hand, the removal of wolves in many parts of Sweden allowed beavers to increase quite rapidly when they were re-introduced.

- the released animals may not be able to deal effectively with their new found freedom (i.e., are not predator aware, etc.)

Releasing animals (repatriating them) also requires a lot of public support.

- ranchers opposed the release of the black footed ferret (mostly because they wanted to control prairie dogs, but also because they don't like the endangered species act).

- even for animals, publicity can be a bad thing:

  - disturbance of the black footed ferret by photographers was to blame for reduced survival.

Bad luck can be important:

- Accidents killed 4/8 California condors.

- A severe storm wiped out 10 Laysan finches the night after they were released (one wonders whether anyone looked at the weather forecast, however).

- Przewalski's horse was established in France, but 3/4 stallions died from congenital defects, and the fourth died due to lightning.

  - Fortunately subsequent releases to Mongolia have worked.

Types of releases:

Hard - simply releasing the animal into the wild. Cheap.

Soft - providing some food, shelter, education (e.g. predator awareness) for the animal as it's released.

- obviously a soft release can help and give the animals time to adjust to their new environment.

- some animals benefit from this (several species of *Peromyscus* were initially released into predator proof enclosures - this helped get them re-established)

If there is no difference, the hard release is a lot cheaper (and if studies show that it works, this is often what is done).

Monitoring:

Whatever happens, monitoring should be done to ensure that the techniques worked, or if they didn't work to try and determine what went wrong.



- this also allows us to figure out when, for example, soft support can be eliminated.

- monitoring should be done in a way that does not interfere with the survival of the animal.

  - radiotelemetry is nice, but it can interfere with movements etc.

Concluding remarks:

Zoos and captive breeding are not necessarily a cure-all.

Insufficient capacity, and sometimes insufficient knowledge, can be severe handicaps if this is tried

- we've tried unsuccessfully for years to breed many species in captivity - cheetahs, Sumatran rhino, etc.

  - perhaps the money would be better spent trying to shore up wild habitats.

But it can work quite well. A final case study: The Arabian oryx.

- by 1972, the last wild population was exterminated.

- fortunately, a program was started to try to save the oryx, and after some tribulations, 9 oryx wound up in Phoenix.

- by 1986, populations in captivity were back up to 700 animals, scattered through various zoos in the U.S. and Europe.

- Starting with eighteen oryx (and some later supplementation), these were re-introduced to Oman.

- by 1996, 400 animals roamed the area without any special management.

[unfortunately, this is not a real success story - by 1998 the population had crashed to 138 animals due to poaching!]

  - but, the captive breeding worked, and further releases in Saudi Arabia have been quite successful (over 600 animals), and even in Oman things are improving.