



ANSWER BOOK

Conservation: keeping a species where it lives, or somewhere else

Classification, biodiversity and conservation · Unit B18

AQA 3.7.4 · OCR A 4.2.1 · Edexcel A Topic 4 (biodiversity and natural resources) · CAIE 18.3

6 questions · 22 marks

NAVY EDITION

SECTION A · Short, 1 to 2 marks

- A1** **B1** in situ: conserving a species in its natural habitat, so that the community and the conditions it is adapted to are conserved along with it. **B1** ex situ: conserving a species outside its natural habitat, in a zoo, a botanic garden, a seed bank or a captive breeding centre. [2]
-

SECTION B · Standard, 3 to 5 marks

- B1** **B1** for: the species still exists, and the alternative when the last wild birds were taken into captivity was extinction within a few years, so on any count of individuals the outcome is a success. **B1** for: the captive breeding worked better than expected. Removing the first egg so that a pair lays another roughly doubled the output, and more than half the birds now fly free rather than being held in enclosures. **B1** against: the cause of the decline has not gone, since carcasses shot with lead ammunition remain the leading source of poisoning, so without continued releases, trapping and treatment the free-flying population would fall again. **B1** against: the population is therefore not self-sustaining in the technical sense, and a disease outbreak in one flock can still remove a substantial part of it, so the programme is a permanent commitment rather than a finished task. **B1** judgement: whether this counts as success depends on the goal. It plainly succeeded in keeping the species in existence, and it has not produced a wild population living without veterinary support, with the remaining obstacle being a rule about ammunition rather than anything biological. [5]
-
- B2** **B1** seed is collected in the wild from many individuals across the population, with locality, date and habitat recorded, then cleaned and X-rayed so that empty or insect-damaged seeds are discarded. **B1** it is dried slowly, typically at about 15 °C and 15 per cent relative humidity, down to roughly 5 per cent moisture content. **B1** it is then sealed in containers and frozen, conventionally at -20 °C, and the drying has to come first because water left in the seed forms ice crystals that rupture the cell membranes. **B1** a sample from each accession is germinated at intervals, commonly every ten years, and if the germination percentage has fallen too far, seed is grown on to produce a fresh batch. [4]
-

- B3** **B1** a captive population is founded by a handful of individuals and held at a [4]
few hundred at most, so it passes through a bottleneck by construction and alleles that
were not in the founders are simply absent. **B1** in a small population the alleles passed
on each generation are a small sample of those present, so frequencies drift by chance
and alleles are lost altogether, and only mutation or migration restores them. **B1**
inbreeding raises the frequency of homozygous recessive genotypes, so inherited
disease and reduced fertility become commoner in the herd. **B1** a studbook records
every individual's ancestry so that the least related animals available can be paired,
and animals are moved between institutions to widen the choice of mates.
-
- B4** **B1** in situ keeps the species where it lives, so the whole community and the [4]
conditions it is adapted to are conserved with it, whereas ex situ conserves the species
alone and cannot conserve its habitat or the species it depends on. **B1** in situ can
support a far larger population, so far fewer alleles are lost to drift and inbreeding,
whereas an ex situ population is founded by a handful of individuals and passes
through a bottleneck. **B1** selection continues to act in situ, so the population stays
adapted to conditions that are themselves changing, whereas captivity selects for
animals that breed well in enclosures and learned behaviour such as hunting or
predator avoidance may never be acquired. **B1** ex situ offers controlled conditions,
veterinary care, assisted breeding and chosen matings, and is the only option for a
species already gone from the wild, whereas a boundary on a map does not stop
poaching, invasive species, pollution or a changing climate.
-
- B5** **B1** the seed cannot be dried to about 5 per cent moisture, and freezing it while [3]
wet would form ice crystals that rupture the cell membranes, so the method depends
on a step these seeds do not survive. **B1** they can be kept as a living collection of plants
in a botanic garden, which takes far more space and labour and holds far fewer
individuals, and therefore far fewer alleles. **B1** embryos can be excised and frozen in
liquid nitrogen, or the plants maintained in tissue culture, both of which are more
expensive and less secure than a seed store.
-