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STRATEGIC GUIDELINES FOR THE TRANSLOCATION OF PRIMATES AND OTHER ANIMALS

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ABSTRACT. — Translocation of wild animals often seems appealing and may be attempted for conservation, educational, commercial, scientific or compassionate reasons. Close examination of the actual and potential problems involved, however, casts doubt on the real value of translocation in many cases. Such problems may revolve around the following factors: cost, capture, transport, release, health, habitat carrying capacity, hunting, hybridisation, social disruption of residents, and ecological disruption by translocated animals. It is argued that translocation should not be attempted except for: (1) the reintroduction of a rare species to its former habitat if such species had been eliminated or reduced to non-viable numbers, provided that it can be guaranteed long-term protection; or (2) the translocation of animals to where they will not come into contact with a viable population of conspecifics and where the recipient ecological community is of no major conservation value.

KEY WORDS. — primates, reintroduction, translocation, carrying capacity, guidelines

INTRODUCTION

The relevance of translocation as a conservation tool and/or a political priority becomes ever greater as human influences in the biosphere deepen and ramify. Logging, mining, dam-building, agriculture and the spread of infrastructure and urban settlements mean that natural ecosystems are being reduced and fragmented almost everywhere (Miles et al., 2005). Climate change, droughts and fires amplify these effects, with huge areas of what were once moist forest ecosystems—for example in Indonesia, Madagascar and the Amazon—now in the process of conversion to fire-maintained grasslands or deserts. Although these changes often create wealth, there is the serious concern that any benefits arising will be temporary as we lose the raw materials of sustainable prosperity, including fresh water, soil fertility, carbon storage, biodiversity, and viable fisheries (Cosslett & van Paddenburg, 2012).

Resisting the loss of biodiversity has become a global issue that influential voices argue "protects all our futures" (Attenborough, 2012). In this context, it is not surprising that translocation is widely seen as a potential solution for particular species that face local or even global extinction. For example, there have been proposals to rescue orang-utans (*Pongo pygmaeus*) from drained and burned peat swamps (Varty et al., 2005), to move elephants (*Elephas maximus*) from oil-palm estates into deep forests (Zaaba et al., 1991), to consolidate scattered and isolated Sumatran rhinos (*Dicerorhinus sumatrensis*) into a small number of reserves where they can be protected from poachers and involved in semi-wild breeding programmes (Ahmad Zafir et al., 2011), and to move tapirs (*Tapirus indicus*) from sites where they are vulnerable and reintroduce them to Borneo as a "safer" island where they once lived (Cranbrook & Piper, 2013). Only time will tell whether these initiatives will achieve lasting success, but it seems certain that wildlife translocation efforts will continue. Our concern in this paper is to help ensure that the resources allocated to translocation are spent as efficiently as possible, and that the investments concerned do more good than harm.

As it is, many people are under the impression that wild animals can be saved from extinction by moving them into a national park, wildlife sanctuary or some other place where they can be guaranteed protection. Clearly, this cannot apply to all species of animals—or plants—not least because there are far too many of them. For example, early surveys of Gunung Mulu National Park in Sarawak resulted in estimates of about 20,000 invertebrates and several hundred vertebrate

species in the park (Anderson et al., 1982). A later assessment of biodiversity in the 500 km^2 Maliau Basin Conservation Area in Sabah concluded that it contained nearly 240,000 species or some 38% of Borneo's entire biota (Caldecott, 2002). It would be impossible to move and re-establish elsewhere even 1% of such arrays of biodiversity if the lands now occupied by the protected area concerned were required for some other use.

Nevertheless it is often felt that a particular species is worth saving individually because it is of special value. Non-human primates, many species of which are threatened, are generally medium-to-large, conspicuous mammals with obvious similarities to humans (Kavanagh, 1983; Mittermeier et al., 2013). Consequently, they are often the subjects of major conservation investments. The orang-utan is a case in point, and when Sarawak's Lanjak-Entimau Wildlife Sanctuary was proposed in the 1970s, it was seen as a potential refuge for any orang-utans surviving in the State's diminishing and disturbed peatland forests. Until a 1981 Forest Department survey showed Lanjak-Entimau to have a good population of resident orang-utans (Kavanagh, 1982), it was thought that this might be the way to stock the sanctuary with apes. This option was rejected, however, when it was seen to pose health and other risks both to the "rescued" apes and to those already in the proposed sanctuary, as well as being likely to be extremely difficult and expensive (Kavanagh, 1982).

Operations of this type always run the risk of being more difficult and expensive than at first envisaged. Because monkeys and apes have often been prime candidates for such translocation exercises, the Conservation Working Party of the Primate Society of Great Britain took the initiative of having a set of guidelines drawn up. They were subsequently revised for use by the International Union for Conservation of Nature (IUCN) Species Survival Commission, as well as being adapted for other audiences (Caldecott & Kavanagh, 1983, 1988; Kavanagh & Caldecott, 1984). They are reproduced here with some additional material because there is a widespread public interest in animal rescue operations and the unrelenting pressure of land-use conversion on natural habitats means that translocation is an option that is bound to be considered time and time again when species are endangered. We argue that such consideration should be accompanied by critical awareness of the problems involved and careful identification of the special cases where it may be justified.

The following guidelines are intended to help wildlife managers and other conservationists decide when translocation is appropriate, and to anticipate and overcome some of the problems that may arise (see also Anon., 1968; Jungius, 1978, 1985; Campbell, 1980; Grahame, 1980; Borner, 1985; Nielsen, 1988). They have informed the most recent UNEP review of great ape population management strategies (Caldecott & Miles, 2005), but we also believe that these translocation guidelines are applicable in principle to the translocation of animals other than primates.

WHY TRANSLOCATION?

Definition. — Translocation may be defined as "the release in a new location of free-ranging animals that come from anywhere other than the place in which they are released" (Caldecott & Kavanagh, 1983: 135). In some cases, it will also involve the removal of animals from a natural community, and this in itself may have conservation significance.

Conservation. — The following rationales may be applicable:

1. A wild population may be threatened with local extinction as a result of habitat destruction, uncontrolled hunting, or for some other reason. In such a case, moving the population elsewhere may be a way of saving it. This may seem to be all the more important if it is the only population of a species or sub-species.
2. A captive population may be wholly or partially "surplus", thus affording an apparent opportunity to restock a suitable wild range.
3. The existence of an apparently suitable habitat may seem to offer a "vacant lot" that could be used to accommodate an additional, or even the only, wild population of a particular species or sub-species.
4. At times, a small and isolated population may be thought to be seriously threatened by inbreeding, which the introduction of conspecifics could relieve.
5. Where a taxon is locally or globally found in only one area, translocating part of the population may avoid having "all the eggs in one basket".
6. Translocation may be used as an alternative to culling. That is, individuals of a species may be removed from a community for one of several reasons: to relieve another, rarer species from competition; to "improve" a population by correcting structural imbalances or weeding out unfit individuals; or, to stabilise oscillations in population size that seem to threaten the population itself. In such a case the translocation may be socially or politically acceptable where culling would not be.

Education. — The following rationale may be applicable:

1. The establishment of an unrestrained animal population in a particular area may create an opportunity to bring people and free-ranging animals into contact, and this may be used for educational purposes.

Commercial. — The following rationales may be applicable:

1. The reasons may be the same as for education, except that the opportunity may facilitate tourism. Education and tourism might thus be combined.
2. If there is a demand for animals for research purposes, a free-ranging population might be established for sustained-yield harvesting.
3. A population of game mammals or birds may be established for hunting purposes.

Scientific. — The following rationales may be applicable:

1. Behavioural research may sometimes be advanced by the artificial introduction of strange animals to each other.
2. Other research questions, such as homing abilities (e.g., Rogers, 1988) might be investigated by translocating individuals or groups of animals.

Compassion. — The following rationale may be applicable:
1. Animals may be translocated in the belief that the individuals concerned would be better off, in the sense of being happier or suffering less than would otherwise be the case.

Human conflict. — The following rationales may be applicable:
1. Translocation may be used if an animal population constitutes a nuisance by threatening human life, health or livelihood.
2. The same would apply in the case of animals that damage or threaten domestic animals or crops.

Other reasons. — The following rationale may be applicable:
1. Both religious and nationalistic sensibilities have motivated people to attempt the translocation of animal populations.

POTENTIAL PROBLEMS WITH TRANSLOCATIONS

Allocation of resources. — Any translocation operation requires the use of resources and, in most cases, large amounts of money and professional expertise will be needed. It is therefore the planner's responsibility to demonstrate that the exercise in question is the best use of these resources in the pursuit of the overall goal of the operation (e.g., species conservation, public education, crop protection, etc.).

Local permission. — The approval and co-operation of the local authorities and communities, including any indigenous people in the area, should be ensured before any release is planned in detail, let alone carried out. This should include provision for monitoring and any other follow-up operations. This must be secured before any irrevocable commitment is made concerning the capture or dispensation of animals. In particular, alternative management options for the animals should not be abandoned before such co-operation has been agreed upon, and all other foreseeable obstacles have been overcome.

Capture. — In the case of the translocation of a free-ranging population, the capture operation may be stressful, or even fatal to some individuals. This may require the development and/or application of new capture techniques, including the use of drug-animal combinations. Successful capture of free-ranging wild animals through the use of chemical immobilisation is not an easy task. As Riney (1982: 352) has put it, "An embarrassingly large number of wild animals have been killed by biologists who read the early descriptions of the technique in scientific publications and who then obtained drugs and equipment and blundered ahead without the adequate technical background." Thus, a feasibility study by experienced professionals and with veterinary supervision will be necessary before starting a capture programme. Ideally, a veterinary surgeon should be available throughout. Early planning may be helped by a review of relevant literature (e.g., Brockelman & Kobayashi, 1971; Seago, 1974; Harthoorn, 1976; Brett et al., 1982; Riney, 1982).

Transport. — Transport can be extremely stressful, and all arrangements should be made and carried out under experienced veterinary supervision. For primate species that are commonly traded, such as macaques (*Macaca* spp.), baboons (*Papio* spp.) and vervet monkeys (*Chlorocebus* spp.), guidelines exist that will help to minimise physical and psychological stress (Graham-Jones, 1974; Nolan, 1975). The same is true of other commonly-handled animals, such as certain ungulates and many bird species, but for rarer taxa there may be no body of experience upon which to draw.

The transporter, however, must create transport conditions which, in addition to satisfying any species-specific demands, will provide the optimum in food, water, fresh air, temperature, light and shade, protection against escape, visual inspection by the accompanying veterinary surgeon, protection against self-injury and injury of one animal by another, protection against cruelty by humans, companionship of other animals (if appropriate), and maternal care of infants. Pregnant females and very young infants are most likely to suffer during transportation, and if possible, translocation should be timed with the breeding season, if any, in mind. Similarly, nutritionally stressed animals are more likely to be vulnerable than others, so strong seasonality in the natural food supply of the animals to be moved is a factor to be considered in timing. All animals will benefit in proportion to the speed at which transport can be carried out, and careful planning, including for contingencies, will minimise delays.

Release. — The immediate release of new arrivals at their destination may result in panicked, disorientated, and possibly unhealthy animals fleeing into an unfamiliar environment. This would place additional stress upon the animals, rule out veterinary care for those that need it, increase the chance of accidental injury, increase the likelihood that individuals will become permanently lost from their groups and infants lost from their mothers, increase the risk of predation, and increase the chances that animals will flee into inappropriate areas, such as farmland, if a release point is at the edge of suitable habitat, which is likely because of access constraints.

The release of translocated animals requires facilities where they may be settled down and maintained in a healthy state while they become familiar with their new surroundings. This procedure also allows for a quarantine period at the end of which the holding cages should be opened quietly, preferably when the animals are least active, so as to encourage them to emerge and explore gradually.

It will be more difficult to keep the animals calm if persons with whom they are not familiar are present when they are released. Therefore, the temptation to turn the release into a media or political event should be resisted.

Rehabilitation. — In the special case of animals, particularly young ones, that have been in captivity, they may not be able to fend for themselves in the wild without a lengthy

learning period. If this is to be managed with human help, it will require the services of extraordinarily dedicated people for a period that may be as long as several years.

Health. — The following considerations must be borne in mind:

1. *Interpopulation variation*: Animals from one natural population may differ from conspecifics of another, even nearby, population in disease characteristics. Thus the transfer of even one individual between two populations poses the risk of either introducing into the host population a disease against which its members have no resistance, or doing the same to the introduced animals.
2. *Human contact*: Because Old World primates are particularly susceptible to human diseases, the release of such an animal that has had human contact into a population that has remained remote from people poses the risk of introducing human diseases to the latter. This remains true even if the only contact that the introduced animals have had with humans was during the translocation operation itself.
3. *Animal contact*: A similar point applies to animals that have come into contact with captive or domesticated animals, from which they may have contracted some disease.
4. *Stress*: this may lower disease resistance and produce unhealthy animals in an otherwise healthy population. Sub-clinical diseases may therefore become a definite hazard to the population purely as a result of stress.

Environmental carrying capacity. — If the species to be translocated is absent from the receiving area, it may be that the environment cannot support a population of the animals concerned, even if there was a population there in the past. It is therefore necessary to know why the species is absent before making the introduction, and to decide whether or not it would be likely to find adequate resources for long-term survival if introduced or reintroduced. Reintroductions might unexpectedly be thwarted, for example, by a change in plant species composition having eliminated essential food sources, or by widespread effects of environmental changes, such as through increased salt-water intrusion, drought and fire associated with climate change. Plans for both introductions and reintroductions must take into account the availability of various resources during worst years and seasons, rather than simple averages, and planners should also be alert to climate change influences.

If the species to be translocated is already present in the receiving area, it must be either at the carrying capacity of the locality or held below that level by a high rate of mortality. Hunting and trapping are the most likely causes of the latter. In either case, it is difficult to see how the introduction of more animals could raise the population level in the long term without there being a change in the environmental circumstances, such as the suppression of hunting, which would achieve the same result without the translocation. The only exception would be when the resident population is so small that it is not viable, yet the circumstances can be changed to enhance the viability of a combined resident-translocated population.

It cannot be emphasized too strongly that without adequate ecological knowledge of donor/recipient communities, translocation is bound to be a considerable gamble (Jewell et al., 1981; Riney, 1982). Similarly, resources invested in translocation can be wasted if the real reasons for the decline of a species are not well understood (Aveling & Mitchell, 1982).

Conflicts with humans. — Before animals are translocated into a new home, an investigation into local hunting practices is required. This is to eliminate the possibility that the translocation will do no more than provide short-term benefits to the local hunters, resulting in the rapid extinction of the introduced population. If it is found that the local inhabitants do hunt, the possibility of persuading them to leave the new arrivals alone should be explored realistically.

Translocations into places where the species have never previously occurred carry the significant risk of creating major pest problems (e.g., Rolls, 1969), with alien invasive species having become a leading cause of biodiversity loss worldwide (e.g., Caldecott et al., 1994). Even when animals are being reintroduced to former habitat, current human activities may make them unwelcome and lead to their persecution. For example, if the absence of a crop-raiding species has permitted the growth of certain agricultural practices, its reintroduction is unlikely to be viable, a possibility that must be investigated before attempting a translocation. See Estes (1981) for such a case involving sea otters (*Enhydra lutris*) and shell fisheries. It is even possible that the local primates may either not crop-raid or do so at level that is tolerable to farmers, but that the new arrivals may do so at a level that the farmers find intolerable. See Kavanagh & Vellayan (1995) for such a case where at least one group of long-tailed macaques (*Macaca fascicularis*) appeared to have been surreptitiously dumped near mango orchards. The newcomers were physically distinguishable by pelage colour from the resident macaques. They were blamed and resented by the farmers for having a high impact as bold crop-raiders, unlike the local monkeys that had not previously been known to cause a problem.

Even medium-sized animals, such as macaques, may constitute a danger to people if they have lost their fear of humans through familiarity. For example, in the Penang Botanical Gardens, long-tailed macaques are well known to be aggressive in demanding food from visitors; and the community around the Brunei Shell Petroleum residences in Seria has recently seen the rise of a similar problem (H. Dols, pers. comm., 2013). In the case of larger animals, such as chimpanzees (*Pan troglodytes*) (Borner, 1985) or leopards (*Panthera pardus*) (Cobb, 1981), the hazards may be even more acute. Candidates for release in the wild should be carefully screened for such possibilities.

Hybridisation. — Where translocated animals are likely to come into contact with resident conspecifics, the introduction of members of a new geographical race or subspecies will result in the artificial formation of a hybrid population. This is undesirable in view of the lengthy process by which local adaptation, including subspeciation, occurs, and because even subtle genetic differences between separate populations are likely to be functional (May & Beddington, 1981; Bateson, 1983; Partridge, 1983).

Social conflicts with residents. — Many species, including most primates, form complex social communities. In some species, the introduction of strangers may disrupt the resident community to the point where it would decrease rather than increase its reproductive success, at least temporarily. For example, one might anticipate group takeovers and infanticide to follow translocation of certain langurs (Hrdy,1977). This possibility should at least be considered, as should the chance that introduced animals may be attacked by conspecifics, as happens among chimpanzees (Borner, 1985).

Ecological disruption. — If conspecifics are absent from the receiving area, the introduction of new species runs the very real risk of creating a major ecological disturbance (Rolls, 1969). This might involve out-competing and eliminating a resident competitor, the extermination of other species by predation, for example on eggs or nestlings, and in the case of large folivorous species like the gorilla (*Gorilla gorilla*), widespread impact on vegetation. Such changes could ramify throughout the ecosystem.

Long-term protection. — The translocated population will require long-term protection that goes beyond temporary enthusiasm and the granting of local permission. It must be guaranteed in such a way that it cannot be revoked with a change of mind or personnel by the relevant local authority.

Finance. — Translocation is expensive. The transfer of some 200 Barbary macaques (*Macaca sylvanus*) from France to Morocco, for example, cost about US$200 in 1980 (close to US$1,000 in 2013 prices, not allowing for modern safeguards) per animal (E. Merz, unpublished data). It is essential that an adequate budget be assured before operations start and that it includes a substantial contingency fund, as unexpected expenses are bound to arise even with the best possible planning.

CONCLUSIONS

Suitable cases. — There are so many problems inherent in translocation that it should not normally be attempted, and never without meticulous planning and adequate funding. An exhaustive feasibility study should precede the operation. The special cases in which we consider translocation to be a viable and constructive option are:

1. The reintroduction of a rare species or subspecies to its former habitat, if the animal in question has been completely eliminated or reduced to non-viable numbers by hunting or some other identified human factor, and if it can be guaranteed long-term protection in the future. This is the only case in which animals might be translocated into a protected natural ecosystem that is itself of conservation value.
2. The introduction or reintroduction of animals for conservation, educational, commercial, scientific, compassionate or other reasons to sites where they will not come into contact with a viable population of conspecifics and where the recipient ecological community either is not of conservation value or is of such value but may not be conserved without the justification of protecting the translocated animals. Thus, whatever happens, the translocation will not bring about the destruction of a viable natural ecosystem.

Independent appraisal. — Any proposal for a translocation project should be thoroughly, independently and publicly refereed in the light of all priorities and problems, ideally with the referee's report being agreed in advance to be binding on all parties.

Translocation and conservation strategy. — In view of the limited number of special cases in which translocation could contribute significantly to the survival of a species, and the many limitations of the technique in other respects, we believe that governments, charities and commercial enterprises should be discouraged from using support for translocation projects as a "soft option" to demonstrate their commitment to conservation. The real business of wildlife conservation has to do with the protection of habitats and their resident fauna and flora. The role of translocation lies in the context of a fully-developed protected area system in each country, and is of little importance outside it.

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