ALWG Statement on

Genetic Considerations for Translocations involving African Lions

Natural population growth is the preferred means of achieving an increase in the number of wild lions that ensures long-term survival of populations. However, intervention in the form of translocation of wild lions may be warranted in some parts of their historic range. Several regional and national lion conservation strategies and action plans list among their objectives reintroduction or augmentation of existing lion populations. This includes re-stocking of extant populations where lion numbers are critically low and re-establishing lions into suitable habitats within their historic range where they have been extirpated and where the causes of their local extinction are largely removed.

A growing interest in re-stocking and re-establishing lion populations suggests that a review and updating of the issues pertaining to translocation is needed. Recently, the IUCN (2013) updated their general guidelines for reintroductions and translocations. An in-depth assessment of the financial costs of large carnivore translocations has also been conducted (Weise et al. 2014). Considerations for translocating lions include but are not limited to: environmental (habitat, prey, other predators), biological (genetics, behavior, disease, parasites), and cultural or social (logistics, economics, public health and safety, and politics). Advances in detecting genetic diversity in African lions, both at the population and phylogeographic scale, suggest that genetic considerations of translocating lions are important; here we provide best-practice guidelines to assist management authorities in the implementation of national action plans.

Genetics should be considered among the most important factors in identifying source populations to be used in translocations. A population's gene pool is shaped by mutation, local selection pressures, and its connectivity to other populations in the landscape (including both gene flow and genetic drift), raising the possibility that genetically distant translocations may, in fact, be maladaptive. Because of the potential for long-term effects on the genetic health and genetic diversity of existing lion populations as well as the phylogeographic diversity of the species, the selection of suitable individuals for newly re-established populations and to augment existing populations is critical.

Based on the evidence that is currently available, the following regional guidelines for sourcing lions for translocations are recommended:

- The deepest and oldest phylogenetic divisions among African lions exist between those in Central and West Africa and those in East and Southern Africa. Under no circumstances should translocations transcend these boundaries. If West African lions are not available for translocations within West Africa, then it would be more suitable to use Central African lions than lions from any country in other regions as far as their phylogeny is concerned.

- There is a relatively high level of divergence among populations from East and Southern Africa. Although the exact patterns of geographic differentiation vary depending on whether nuclear or mitochondrial markers are consulted, the oldest split within this clade divides populations in South West Africa (i.e. Namibia and Angola) from populations in East and Southern Africa. It is, therefore, recommended that lions not be translocated between South West African and East and Southern African populations.

- In some cases, a geographic barrier seems to explain the isolation and divergence between populations, e.g. the Asiatic lion population, which is isolated from all African populations due to local extinction of lion populations in North Africa and the Middle East, as well as historic expansion of the Sahara desert. The genetic differences between West and Central Africa are suggested to follow the Niger River, which may have functioned as a barrier for lion dispersal. The Rift Valley has been mentioned as a potential barrier. However, available data suggest that gene flow across the Rift Valley does occur, at least in some regions.

- Reflecting their substantial capacity for dispersal, lions exhibit an isolation-by-distance pattern of genetic variability. When major divisions are not involved, it is always better to use nearby populations as sources for translocations to avoid the theoretical risks associated with outbreeding depression and to maintain phylogeographic diversity.

- Lions in fenced reserves in South Africa are managed as a separate metapopulation due to random mixing of multiple genetic stocks and are, therefore, not recommended as a source for any translocations outside of the metapopulation. Similarly, introduced populations of mixed genetic stocks in other countries, e.g. Bubye Valley Conservancy and Save Valley Conservancy, are not recommended as sources for translocations outside of these mixed-stock populations.

- For future scientific monitoring, it will be critical to document the details of all translocations, especially efforts aimed at re-establishing populations. Genetic samples should be preserved from founding populations and their provenance recorded; both

samples and information relating to them should be shared with the research community to help monitor range-wide patterns of genetics and connectivity.

Our knowledge of lion genetics continues to increase rapidly. Therefore, it is our recommendation that all available genetic information be considered on a case-by-case basis to identify and source the most appropriate lion stock prior to initiating any translocation. The ALWG stands ready to consult with wildlife authorities and other stakeholders on candidates for planned translocations and possible alternatives.

IUCN/SSC (2013). *Guidelines for Reintroductions and Other Conservation Translocations.* Version 1.0. Gland, Switzerland: IUCN Species Survival Commission, viiii + 57 pp. https://portals.iucn.org/library/sites/library/files/documents/2013-009.pdf

Weise FJ, Stratford KJ, and van Vuuren RJ (2014). Financial costs of large carnivore translocations – accounting for conservation. PLoS ONE 9(8): e105042. doi: 10.1371/journal.pone.0105042.